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AFFDL-TR-71-108, PART II

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PREDICTION OF UNSTEADY AERODYNAMIC LOADINGS OF NON-PLANAR WINGS AND WING-TAIL CONFIGURATIONS IN SUPERSONIC FLOW

Part II Computer Program Description

GORDON D. KRAMER
GEORGE E. KEYLON

THE BOEING COMPANY
COMMERCIAL AIRPLANE GROUP

TECHNICAL REPORT AFFDL-TR-71-108, PART II

MARCH 1972

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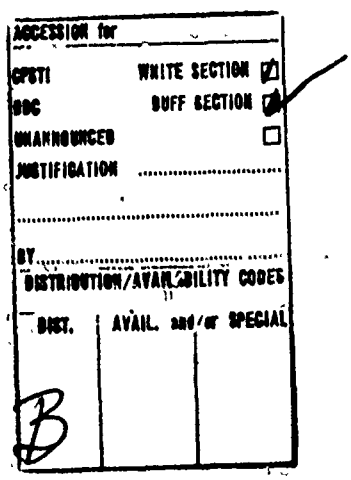

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FOREWORD

Part II of this report was prepared by Boeing Computer Services, Inc., in conjunction with The Boeing Company, Commercial Airplane Group, Renton, Washington for the Aerospace Dynamics Branch, Vehicle Dynamics Division, Air Force Flight Dynamics Laboratory, Wright-Patterson Air Force Base, Ohio, under Air Force Contract AF 33615-70-C-1126, "Unsteady Aerodynamics and Flutter of Wing Horizontal Tail Configurations in Supersonic Flow". This work was conducted under Project No. 1370, "Dynamic Problems in Military Flight Vehicles" and Task No. 137003, "Prevention of Dynamic Aeroelastic Instabilities in Advanced Military Aircraft". Part II of this report is intended to describe in detail the computer program developed under the above contract, and is subsidiary to Part I, Theoretical Development, Program Usage, and Application.

Mr. William S. Rowe of The Boeing Company served as supervisor of the work covered under this contract. The co-authors of this part of the report worked from engineering analyses prepared and documented in Part I by Dr. J. M. Ii, C. J. Borland and J. R. Hogley. Mr. Lawrence J. Huttsell of the Aerospace Dynamics Branch (FYS) was Project Engineer. Appreciation is expressed to Mr. H. Huffman and Mr. R. Hirst for graphical work done in this report.

Manuscript was released by the authors in August, 1971 for publication as an AFFDL report.

This report has been reviewed and approved.

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ABSTRACT

The Mach box technique has been extended to include wing and tail with dihedral angles and vertical separation. A digital computer program, written in FORTRAN, is presented. The program provides for up to nine sweep angles of the leading and trailing edges of each surface. First order piston theory thickness correction is available as an option, and two refinement procedures are provided, subdivision with averaging and velocity potential smoothing. For a maximum of twenty oscillatory mode shapes the program calculates normal washes, velocity potentials, lifts, pressures and generalized forces matrices. If only one surface is being analyzed, sampling of wake up-wash, side-wash and longitudinal wash is available.

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NOMENCLATURE

Mathematical Symbol	FORTRAN Symbol	Dimension	Definition
a		length/time	Speed of Sound = U/M
$A(n,m)$		area	Integration area of box n,m
b_1	B1	length	Chordwise dimension of Mach box.
b_{1S}	B1S	length	b_1/N_S = chordwise dimension of a subdivided box.
$C_{\bar{\nu}\bar{\mu}\bar{\lambda}}$	C	non-dimensional	Velocity potential spatial aerodynamic influence coefficient (AIC).
$C_{\bar{\nu}\bar{\mu}\bar{\lambda}}^{\left(\frac{xy}{ab}\right)}$	C	non-dimensional	Spatial AIC giving velocity potential at a point on surface "xy" due to constant outward normal wash over a box on surface "ab"; possible values for superscripts are x or a {R-right, L-left} y or b {W-wing, T-tail}
$C_{\bar{\nu}\bar{\mu}0}$, $C_{\bar{\nu}\bar{\mu}}$	PKERNL	non-dimensional	Velocity potential planar AIC
$C^{S}_{\bar{\nu}\bar{\mu}0}$	SKERNL	non-dimensional	Planar AIC defined for subdivided sending boxes.
$\Delta\bar{C}_{p_j}^{n,m}$	DELCP	1/length	Pressure coefficient difference at box n,m for the jth mode (program output)
l_c, c	--	length	Local reference chord

NOMENCLATURE

Mathematical Symbol	FORTRAN Symbol	Dimension	Definition
$C^m_{\ell_j}$	--	1/length	Local lift coefficient per unit span for the jth mode
$C^m_{m_j}$	SECMOM	$1/(\text{length})^2$	Local moment coefficient per unit span for the jth mode
c_{rW} / c_{rT}	---	length	{Wing / Tail} root section chord length.
$\frac{D}{Dt}$	--	1/time	Substantial derivative; $\frac{D}{Dt} = \frac{\partial}{\partial t} + U\frac{\partial}{\partial x}$
$f_j(x,y)$	DEFSL(1,L)	non-dimensional	j^{th} mode shape deflection at location (X,Y).
f_{ij}	---	non-dimensional	Deflection of ith lumped mass in mode j
$\frac{\partial f_j(x,y)}{\partial x}$	DEFSL(2,L)	1/length	Slope of jth mode shape function.
$\bar{f}_j^{n,m}$	---	time	Scaled modal displacement at box n,m $\bar{f}_j^{n,m} = \frac{b_1}{U} f_j^{n,m}$
J_j		1/length	j^{th} mode shape deflection / s
I_i	---	mass x length^2	Moment of inertia about the elastic axis of the ith lumped mass
K_{ij}	---	force/length	Generalized stiffness
k_s	XKS	Non-dimensional	Reduced frequency based on leading planform semi-span, $k_s = \frac{\omega s}{U}$

NOMENCLATURE

Mathematical Symbol	FORTRAN Symbol	Dimension	Definition
k_1	XKI,K1	non-dimensional	Reduced frequency based on the chordwise dimension of the Mach box $k_1 = \frac{\omega b_1}{U}$
$\bar{k}_1$	K1BAR	non-dimensional	$k_1 M^2/\beta^2$
L	CAPL	non-dimensional	Vertical separation of the center lines of the 2 surfaces, positive upward measuring from the wing to the tail.
$L_j^{n,m}$	--	force/length	lift on box n,m for the jth mode
L_j^{m}	--	force/length	lift on the mth chordwise strip of boxes for the jth mode.
L_j	--	force/length	lift on a complete half-surface or half-airplane for the jth mode.
$\bar{L}_j^{n,m}$	--	force/length	amplitude of box lift $L_j^{n,m}$
$\bar{L}_j^{m}$	--	force/length	amplitude of section lift L_j^{m}
$\bar{L}_j$	--	force/length	amplitude of total lift L_j
$\bar{\bar{L}}_j^{n,m}$	BXL1FT	non-dimensional	Non-dimensional amplitude of box lift (program output) $L_j^{n,m} = \bar{L}_j^{n,m} e^{i\omega t} = q\left(\frac{b_1}{\beta}\right) \bar{\bar{L}}_j^{n,m} e^{i\omega t}$

NOMENCLATURE

Mathematical Symbol	FORTRAN Symbol	Dimension	Definition
$\bar{\bar{L}}_j^m$	SLIFT	non-dimensional	nondimensional amplitude of section lift (program output) $L_j^n = \bar{\bar{L}}_j^n \, e^{i\omega t} = q\left(\frac{b_1}{\beta}\right) \bar{\bar{L}}_j^n \, e^{i\omega t}$
$\bar{L}_j$	TLIFT	non-dimensional	Nondimensional amplitude of total lift (program output) $L_j = \bar{L}_j \, e^{i\omega t} = q\left(\frac{b_1}{\beta}\right) \bar{L}_j \, e^{i\omega t}$
ℓ	EL	non-dimensional	The ℓ_c coordinate location of a pulse receiving point, i.e., the perpendicular distance from the sending plane to receiving point.
M	XMACH	non-dimensional	Mach number
M_{jj}	--	mass	Generalized mass for the jth mode
m	--	non-dimensional	The m_c coordinate location of a pulse receiving point.
m_i	--	mass	i^{th} lumped mass
$N_{xyz}^{n,m}$	ENRUS ENRLS, EN, ENSUBD	non-dimensional	Normal wash at box n,m on surface "xyz" due to local source strength, where possible subscript values are: x = {R-right, L-left}; y = {U-upper, L-lower}; z = {W-wing, T-tail}. e.g. $N_{RUW}^{n,m}$ means normal wash on the right upper wing at box n,m

NOMENCLATURE

Mathematical Symbol	FORTRAN Symbol	Dimension	Definition
$\hat{N}^{n,m}_{xyz\ abc}$	ENRULU, ENRLLL, ENRURW, ENRULW	non-dimensional	Normal wash at box n,m on surface "xyz" due to remote source strengths on surface "abc", where possible subscript values for a,b, and c are the same as for x,y, and z, respectively, defined above; e.g. $\hat{N}^{n,m}_{RUT\ LLW}$ means normal wash at box n,m on the right upper tail due to source strengths on the left lower wing.
N_s	NSUBDV	non-dimensional, odd integer	No. of "sub-boxes" (chordwise and spanwise) to be used in the subdivision improvement technique.
n	--	non-dimensional	the n_c coordinate location of a pulse receiving point.
n_c, m_c, ℓ_c	---	---	Sending Surface Coordinate System
$\bar{n}_c, \bar{m}_c, \bar{\ell}_c$	---	---	Receiving Point Coordinate System
$p, p(x,y,t)$	---	force/area	local static pressure
p_∞	---	force/area	Free stream static pressure
$\Delta p(x,y,t)$	---	force/area	pressure difference between upper and lower surfaces at point (x,y) at time t $\Delta p(x,y,t) = p(x,y,t)_{upper} - p(x,y,t)_{lower}$

NOMENCLATURE

Mathematical Symbol	FORTRAN Symbol	Dimension	Definition
$\Delta\bar{p}(x,y)$	--	force/area	Amplitude of pressure difference: $\Delta p(x,y,t) = \Delta\bar{p}(x,y)e^{i\omega t}$
Q_{ij}		force/length	Generalized force due to the deformation in the ith elastic mode and loading for the jth modal deflections
$\bar{Q}_{ij}$	--	force/length	Amplitude of generalized force
$\bar{\bar{Q}}_{ij}$	GENAF	non-dimensional	Non-dimensional generalized force (program output); $Q_{ij} = \bar{Q}_{ij}e^{i\omega t} = q\frac{b_l}{\beta}\bar{\bar{Q}}_{ij}e^{i\omega t}$
$\hat{Q}_{ij}$	QAGARD	1/(length)^2	Generalized force in the AGARD notation
Q'_{ij}, Q''_{ij}	GENAFC	1/(length)^2	Real and imaginary parts of $\hat{Q}_{ij}$ in the AGARD definition (program output)
q	--	force/area	dynamic pressure
$q_j(t)$	--	length	Generalized coordinate relating physical deflection to j^{th} modal deflections: $Z(x,y,t) = \sum_j f_j(x,y)\,q_j(t)$
$\bar{q}_j$	--	length	Amplitude of jth generalized coordinate
s	S	length	Wing semi-span.

NOMENCLATURE

Mathematical Symbol	FORTRAN Symbol	Dimension	Definition
S	--	length^2	Area of integration. Bounded by edge of planform plus diaphragm and lying inside the forward Mach cone of the receiving point.
t	--	time	Time
U	--	length/ time	Free stream velocity.
$U_{\bar{\nu}\bar{\mu}\bar{\lambda}}$	---	non-dimensional	Velocity spatial AIC for perturbation velocity parallel to the free stream.
$\mathbf{u}$	---	length/ time	Perturbation velocity in the streamwise direction, positive downstream.
$V_{\bar{\nu}\bar{\mu}\bar{\lambda}}$	V	non-dimensional	Velocity spatial aerodynamic influence coefficient (AIC) for velocity normal to the free stream and parallel to the sending surface.
$V^{(xy)}_{(ab)\ \bar{\nu}\bar{\mu}\bar{\lambda}}$	V	non-dimensional	Spatial AIC giving velocity normal to the free stream and parallel to surface "ab" at a point on surface "xy" or in the flowfield (FF), due to constant normal wash over a box on surface "ab"
v		length/ time	Perturbation velocity in the spanwise direction, positive right (looking upstream).
$W_{\bar{\nu}\bar{\mu}\bar{\lambda}}$	W	non-dimensional	Velocity spatial aerodynamic influence coefficient (AIC) for velocity normal to the sending plane.

NOMENCLATURE

Mathematical Symbol	FORTRAN Symbol	Dimension	Definition
$w_{\nu\mu\lambda}^{(xy)}$	W	non-dimensional	Spatial AIC giving velocity normal to surface "ab" at a point on surface "xy" or in the flow field (FF) due to a constant normal wash over a box on surface "ab".
w		length/time	Perturbation velocity in the vertical direction, positive upward.
X,Y,Z		length	Reference (global) coordinate system, X positive aft, Y positive right, Z positive upward.

NOMENCLATURE

Mathematical Symbol	FORTRAN Symbol	Dimension	Definition
X_w, Y_w, Z_w			Wing local coordinate system.
X_T, Y_T, Z_T			Tail local coordinate system
X_{WLE}	XWLE	length	The location of a leading edge definition point of the wing planform, measured along the X_w co-ordinate.
X_{TLE}	XTLE	length	Same as above for the tail planform, measured along the X_T coordinate.
X_{WTE}	XWTE	length	The location of a trailing edge definition point of the wing planform.
X_{TTE}	XTTE	length	Same as above for the tail, measured along the X_T co-ordinate.
$\left\{\begin{matrix} X_F \\ X_c \end{matrix}\right\}$	$\left\{\begin{matrix} \text{XEDGE} \\ \text{XCENTR} \end{matrix}\right\}$	length	Location of the $\left\{\begin{matrix} \text{edge} \\ \text{center} \end{matrix}\right\}$ of a Mach box used for the placement of the box pattern, measured along the X_W coordinate.
$\left\{\begin{matrix} X_{CW} \\ X_{CT} \end{matrix}\right\}$			The location of the most upstream row of boxes on the $\left\{\begin{matrix} \text{wing} \\ \text{tail} \end{matrix}\right\}$ measured along the $\left\{\begin{matrix} X_W \\ X_T \end{matrix}\right\}$ co-ordinate.

NOMENCLATURE

Mathematical Symbol	FORTRAN Symbol	Dimension	Definition
$\begin{Bmatrix} Y_{WLE} \\ Y_{TLE} \end{Bmatrix}$	$\begin{Bmatrix} YWLE \\ YTLE \end{Bmatrix}$	length	The location of a leading edge definition point of the $\begin{Bmatrix} wing \\ tail \end{Bmatrix}$ planform measured along coordinate $\begin{Bmatrix} Y_W \\ Y_T \end{Bmatrix}$.
$\bar{y}$	YBAR	non-dimensional	Offset of receiving chord from the nearest sending chord.
$\begin{Bmatrix} Z_u \\ Z_L \end{Bmatrix}(x,y,t)$	--	length	$\begin{Bmatrix} Upper \\ Lower \end{Bmatrix}$ surface deflection at (x,y) as a function of time
$Z_m(x,y,t)$	--	length	mean surface deflection: $Z_M(x,y,t) = f_j(x,y)e^{i\omega t}$
$Z_\tau(x,y)$	--	length	Local thickness at (x,y)
$\frac{\partial Z_\tau}{\partial x}(x,y)$	TSLFN	non-dimensional	Local thickness slope at (x,y)
$\bar{\bar{Z}}_\tau$	--	non-dimensional	Thickness slope piston theory correction; $\bar{\bar{Z}}_\tau = 1 + \frac{\gamma+1}{2} M \frac{\partial Z_\tau}{\partial x}$
$\alpha^{n,m}$	ALPHA	non-dimensional	Edge box area ratio for box(n,m).
β	BETA	non-dimensional	$\sqrt{M^2 - 1}$

NOMENCLATURE

Mathematical Symbol	FORTRAN Symbol	Dimension	Definition
b_1 /β	BIBETA	length	Spanwise dimension of the Mach box.
b_{1_s} /β	BIBTAS	length	Spanwise dimension of a subdivided Mach box.
γ	GAMMA	non-dimensional	Ratio of specific heats, = 1.4
ζ	ZETA	non-dimensional	Dummy variable in the Z_w or Z_T coordinate.
$\bar{\eta}$	ETABAR	non-dimensional	Dummy variable of integration in the $\bar{m}_c$ coordinate.
θ	THETA	radians	$\sin^{-1}\frac{\bar{\eta}}{\tau} = \sin^{-1}\frac{\bar{\eta}}{\sqrt{\bar{\zeta}^2 - \bar{\lambda}^2}}$
θ_{ij}	--	radians/length	Torsion of ith lumped mass in mode j.
$\bar{\lambda}$	--	non-dimensional	$\bar{\ell}_c$ coordinate location of a pulse sending box.
μ	MU,YMU	non-dimensional	m_c coordinate location of a pulse sending box.
$\bar{\mu}$	YMUBAR	non-dimensional	$\bar{m}_c$ coordinate location of a pulse sending box.

NOMENCLATURE

Mathematical Symbol	FORTRAN Symbol	Dimension	Definition
ν	NU, XNU	non-dimensional	n_c coordinate location of a pulse sending box.
$\bar{\nu}$	XNUBAR	non-dimensional	$\bar{n}_c$ coordinate location of a pulse sending box.
ξ	XI	non-dimensional	Dummy variable of integration in the X_w ot X_T coordinate.
$\bar{\xi}$	XIBAR	non-dim dimensional	Dummy variable of integration in the $\bar{n}_c$ coordinate.
ρ, ρ_∞	--	Mass/ volume	Free stream density.
τ	TAU	non-dimensional	$\sqrt{\bar{\xi}^2 - \bar{\lambda}^2}$
$\phi(x,y,t)$	--	length^2/ time	Disturbance velocity potential at point (x,y) and time t, defined so that $\frac{\partial \phi}{\partial x_i}$ is velocity, positive in positive x_1 direction, where x_i = X, Y, or Z
$\Delta\phi(x,y,t)$	--	length^2/ time	Disturbance velocity potential difference between the top and bottom side of the surface at point (x,y) and time t: $\Delta\phi(x,y,t) = \phi_{upper} - \phi_{lower}$

NOMENCLATURE

Mathematical Symbol	FORTRAN Symbol	Dimension	Definition
$\Delta\bar{\phi}_j(x,y)$	--	length / time	Amplitude of velocity potential difference at point (x,y) or for box n,m for the jth mode
$\Delta\bar{\bar{\phi}}_j(x,y)$ $\Delta\bar{\bar{\phi}}_j^{n,m}$	DELPHI	non-dimensional	Non-dimensional velocity potential difference due to the unit j^{th} generalized coordinate (program output); $\Delta\phi_j^{n,m} = \Delta\bar{\phi}_j^{n,m} e^{i\omega t} = \frac{U}{b_1}\left(\frac{b_1}{\beta}\right)\Delta\bar{\bar{\phi}}_j^{n,m} e^{i\omega t}$
$\Delta\bar{\bar{\phi}}_j(X_{TE},y)$ $\Delta\bar{\bar{\phi}}_j^{m}{}_{TE}$	TVP	non-dimensional	Trailing edge velocity potential difference.
$\left\{\begin{matrix}\psi_w\\ \psi_T\end{matrix}\right\}$	$\left\{\begin{matrix}\text{PSIW}\\ \text{PSIT}\end{matrix}\right\}$	degrees	Dihedral angle of $\left\{\begin{matrix}\text{wing}\\ \text{tail}\end{matrix}\right\}$, radians, positive upwards from horizontal.
ω	---	radians/ time	Circular frequency
ω_j	---	radians/ time	Circular frequency of mode j

Superscripts

$\left.\begin{matrix}(n,m)\\ (\nu,\mu)\end{matrix}\right\}$ Box location

Subscripts

L	Lower limit of Integration; Left-hand surface; Lower surface
R	Right-hand Surface
S	Subdivided
T	Tail
U	Upper limit of Integration; Upper Surface
W	Wing
FF	Flowfield

GLOSSARY OF TERMINOLOGY

Aftmost Box - Each chord on each planform and diaphragm combination has one such box. It is the aftmost box on that chord for which AIC arrays must be calculated and may be on the planform or diaphragm.

AIC - Aerodynamic Influence Coefficient

Area Ratio - On-planform fraction of a box which is cut by the planform boundary.

Apex Box - The box on the sending surface which encloses the apex of the Mach hyperbola associated with the receiving box.

Box Grid - Non-dimensionalized geometric array of boxes whose extent is determined by the geometric properties of the planforms. The term "grid" embraces the arrays on both surfaces.

Control Point - The location at which a receiving box is deemed to be influenced by other boxes. In general, the center of the receiving box.

Effective Area - A concept which relates entirely to the sub-division technique. It is composed of those boxes sufficiently close to the receiving box that their influence on it is large enough for the subdivision refinement to affect results significantly. The size has been arbitrarily set to include the N_{BOX}/N_S rows immediately ahead of the receiving box.

Global Co-ordinate System - An overall reference system of co-ordinates. For example, the airplane co-ordinate system X ~ aft, Y~right, Z~up. Y = 0 at centerline of airplane.

Leading Edge Diaphragm - All diaphragms on which $\Delta\phi = 0$.

Local Co-ordinate System - A co-ordinate system lying in the plane of the surface. x~aft, y~root to right tip. y = 0 at center line of airplane.

Longitudinal Separation - Streamwise distance between the trailing edge of the wing and the leading edge of the tail, measured along the centerline.

GLOSSARY OF TERMINOLOGY

Mach Asymptote - The asymptote of the Mach hyperbola.

Mach Hyperbola - The intersection of the sending plane and the forward Mach cone of the receiving point. Since this is always non-dimensionalized, it is a rectangular hyperbola.

Map - A condensed description of a large amount of data which can be used to locate any desired data element. A map of a banded sparse matrix might consist of two numbers per row, the first being the first non-zero column of that row and the second being the band width for that row. The matrix itself could then be stored as band elements only.

Normal Offset - The l_c distance between the sending box and the receiving point.

Parallel Offset - The m_c distance between the sending box center and the receiving point.

Partial Box - A sending box which is cut by the Mach hyperbola but which is neither an apex box nor an edge box.

Planar A.I.C.- An A.I.C defined by the geometric relation between a sending box and receiving box which lies in the same plane. $C_{\bar{\nu},\bar{\mu},0}$ only.

Receiving Box - In defining the relationship between two boxes the receiving box is the box which can be influenced by the other box.

Receiving Chord - Those receiving boxes which lie on the same chord. The receiving chord is significant in that all the boxes lying on it use AIC arrays which are a subset of those for the aftmost box lying on that chord.

Sending Box - In defining the relationship between two boxes, the sending box is the box which influences the other box (c.f. Receiving Box).

Spatial A.I.C. - An AIC defined by the geometrical relationship between two boxes which do not lie in the same plane. $C_{\bar{\nu},\bar{\mu},\bar{\lambda}}$, $V_{\bar{\nu},\bar{\mu},\bar{\lambda}}$, $W_{\bar{\nu},\bar{\mu},\bar{\lambda}}$.

GLOSSARY OF TERMINOLOGY

Sub-box - A member of the array of boxes formed when the grid of sending boxes is subdivided. Note it refers to the small box which is a fraction of the large box, and not to a large box which has been subdivided.

Tail - The downstream surface.

Vertical Separation - The vertical distance between the center lines of the two surfaces. Positive if the second surface is above the first.

Wake Diaphragm - That part of the diaphragm where $\Delta P = 0$ due to the influence of a surface.

Wing - Upstream Surface - (E.g. a Canard could be referred to as a wing);

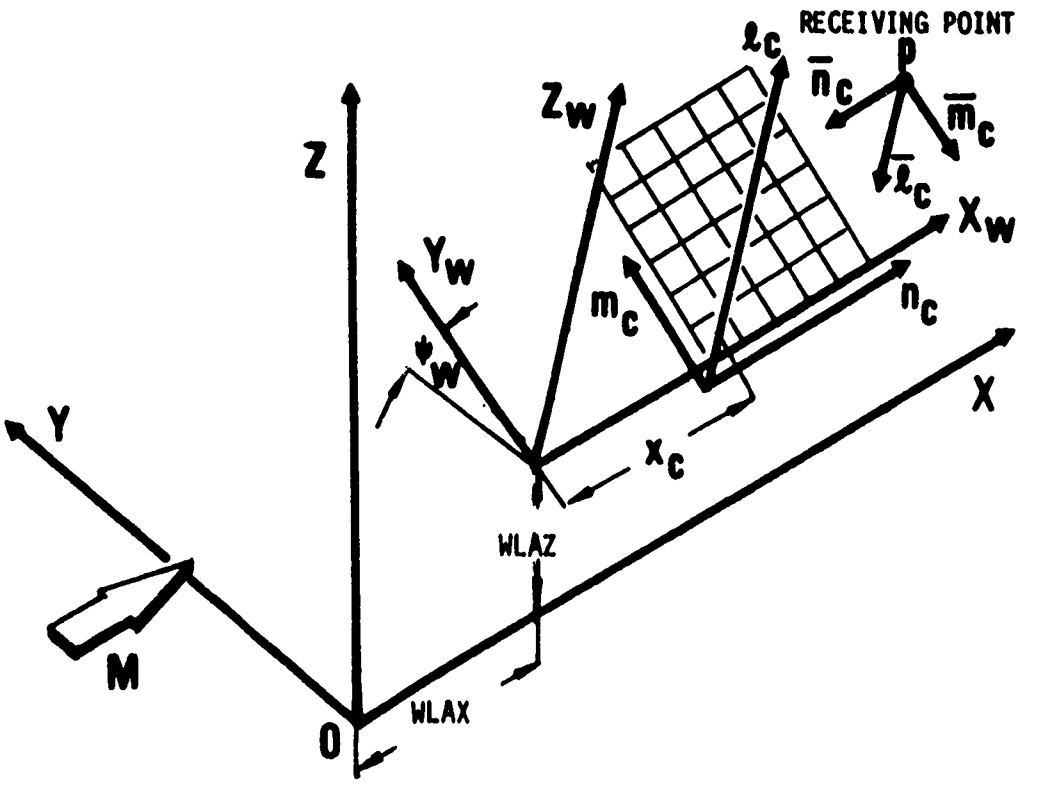


Figure 1 Coordinate Systems For A Right Wing

Symbol	Transformation	Definition	Dimension
X Y Z	Global or Reference Coordinate System. X positive Aft, Y positive Right, Z positive Upward		Length
X_w Y_w Z_w	X - WLAX $Y\cos\phi_w + (Z - WLAZ)\sin\phi_w$ $(Z - WLAZ)\cos\phi_w - Y\sin\phi_w$	Wing Local Coordinate System, used to define wing leading and trailing edges. X_T, Y_T, Z_T are similarly defined for the tail local axes	Length
n_c m_c ℓ_c	$(X_w - X_c)/b_1 + 1$ $Y_w/(b_1/\beta) + 1/2$ $Z_w/(b_1/\beta)$	Sending Surface Coordinate System used to define box grid. The (n_c, m_c) plane lies within the plane of the sending surface, in this case the right wing.	Non-dimensional

Figure 1 (Cont'd)

Symbol	Transformation	Definition	Dimension
$\bar{n}_c$ $\bar{m}_c$ $\bar{l}_c$	$-(n_c-n)$ $-(m_c-m)$ $-(l_c-l)$	Receiving Point Coordinate System parallel to the n_c,m_c,l_c coordinates but opposite in sign and having their origin at the pulse receiving point (n,m,l in the n_c,m_c,l_c coordinates)	non-dimensional

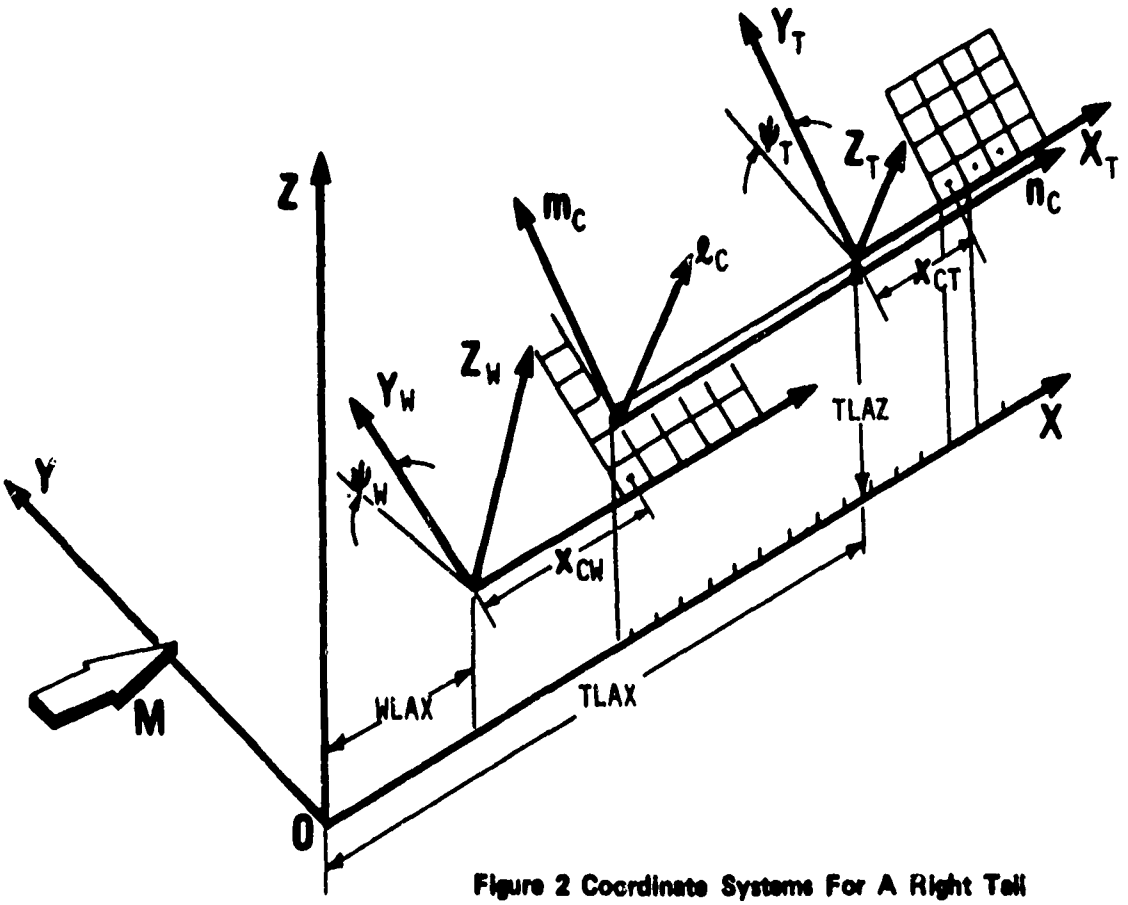


Figure 2 Coordinate Systems For A Right Tail

SYMBOL	TRANSFORMATION	DEFINITION	DIMENSION
X_T Y_T Z_T	X-TLAX $Y\cos\psi_T+(Z-TLAZ)\sin\psi_T$ $(Z-TLAZ)\cos\psi_T-Y\sin\psi_T$	Tail Local Coordinate System used to define tail leading and trailing edges.	length
n_c m_c ℓ_c	$\{X_T+TLAX-(WLAX+X_C)\}/b_1+1$ $Y_T/(b_1/\beta) + 1/2$ $Z_T/(b_1/\beta)$	Sending Surface Coordinate System. In this case the right tail is shown as the sending surface.	non-dimensional

SECTION I

INTRODUCTION

Part II of this report describes the computer program written according to the analysis of Part I. Part II refers implicitly to Part I, Section III, Computer Program Usage, and material covered there is not repeated here. The program computes generalized unsteady air forces on a wing or wing and tail in supersonic flow, given geometric details of the surfaces and the oscillatory mode shapes of the surfaces. The surfaces may be coplanar, may have dihedral angles, and may be separated vertically. The Mach box technique may be used "straight", or three refinements may be applied: 1) Subdivision of the Mach boxes to improve velocity potentials, 2) Least-squares smoothing of calculated velocity potentials to eliminate roughness due to box representation of surface edges, 3) Piston theory correction for airfoil thickness. The refinements may be applied in any combination. As intermediate results, normal-wasnes, velocity potentials and wake sampling of upwash, sidewash and longitudinal washes may be printed, all at box center locations. The box lifts, pressure distribution, section lifts and total lift are also available for each mode.

SECTION II

COMPUTER PROGRAM DESCRIPTIONS

1. GENERAL DESCRIPTION

The computer program consists of a main (0,0) overlay, one primary level overlay, and eight secondary level overlays (see fig. (3)). The main (0,0) overlay is a general purpose driver, and easily can be used to incorporate other compatible programs with this one as a complete flutter system. Its sole function is to set up buffers and any other system oriented parameters, then call the primary level overlay, CONTROL.

Overlay CONTROL contains the basic logic of the program. It first calls secondary overlay DATAPP, which reads and processes the basic card data necessary for execution of the program. The resulting parameters are stored in labelled common blocks, accessible to all other overlays.

If PRVGEOM = .FALSE., overlay GEOMBX is next called. The planform geometry is read and processed to yield a disk file IGEOSC containing all internally necessary geometric parameters.

If PRVMODE = .FALSE., overlay CONTROL next calls overlay MODES. This area processes the three forms of modal data and places the results, evaluated at box centers, on scratch file MODESC.

Overlay CONTROL next enters a loop on reduced frequency. Each pass through the loop first executes overlay VICMAIN, which computes (or reads from previously saved tapes) all AIC arrays needed at the current reduced frequency. Next overlay NWVPMBX is called, to compute normal-washes, velocity potentials, and optional sample washes. If SMOOTH = .TRUE. overlay SMTH is called to do a least-squares surface fit of the resulting $\Delta\bar{\phi}$ arrays. If CRDFIT = .TRUE. overlay CHORDF is called to smooth the $\Delta\bar{\phi}$ values a chord at a time. The final overlay, FORCES, then computes box lifts, section lifts and generalized forces for any smoothed $\Delta\bar{\phi}$ values first, then for the unsmoothed values. The desired results are printed as they are computed. The loop on reduced frequencies terminates at this point.

Overlay CONTROL reads the termination card which causes a transfer back to the execution of DATAPP (Recycle), the call of another overlay (if available), RETURN to the main (0,0) overlay, or EXIT to control cards.

The following sections give a more detailed description of all of the overlay main programs, and the major subroutines called by each.

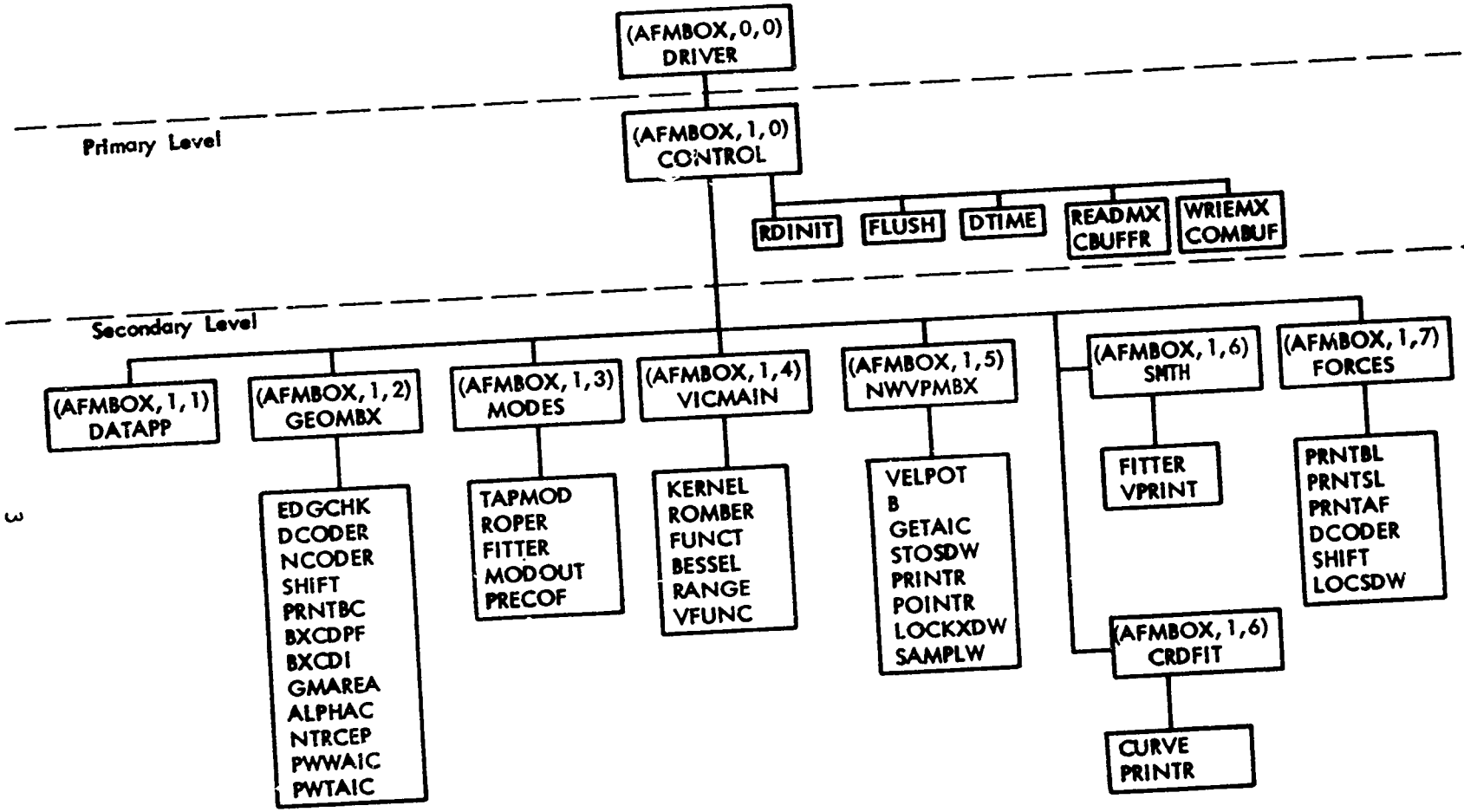


Figure 3 Program Overlay Structure

1. GENERAL PURPOSE SUBROUTINES

Fortran Callable COMPASS Function SHIFT

Author: G. E. Keylon

Purpose: To shift the contents of a word left or right a specified number of bits, identical to the Fortran Extended capability.

Method: The word and the number of bits to be shifted are stored in machine registers. The word is then left circular shifted the number specified. This causes the word to be shifted left circular if the number is positive and right with sign extension if the number is negative. The result is left in register X6 so that this routine must be used as a function subprogram.

Usage:

```
INTEGER SHIFT
.
.
.
IWORD = SHIFT (NWORD,N)
```

Input
- NWORD - The word to be shifted
- N - The number to shift the word
  If N is positive shift left circular.
  If N is negative shift right with sign extension.

Output
- IWORD has the results of the shift on NWORD.

Fortran Subprogram WRTEMX

Author: G. E. Keylon

Purpose: To write a matrix on a tape or disk file.

Method: The matrix is placed row-wise into a buffer in labelled common RWBUFF with all of the unused areas of its array omitted. The buffer is then written onto the specified tape or disk file with the Fortran BUFFER OUT statement. A 16 word header record is written in the same manner before each matrix. The header record contains matrix size, name and optional parameters.

Usage: CALL WRTEMX (IOUTFL, MXWRIT, RANDOU, NFS, NMS, LS, NMR, LWS, K, ID, A, ITYPE, M, N, PARM, IRR)

Input

IOUTFL - Tape number or left-justified file name.
MXWRIT - Logical variable, not used.
RANDOU - .T. Random File (not used)
.F. Sequential File
NFS - Number of files to space before writing
NMS - Number of matrices to space before writing
LS - Level number to space (not used)
NMR - Name or number in random index (not used)
LWS - Level number of this matrix (not used)
K - Row dimension of array A.
if K≤ matrix is already in /RWBUFF/
ID - Array containing matrix nome.
A - Array containing matrix
ITYPE - TYPE of matrix (i.e., real, complex, integer, null, mixed)
M - Row dimension of matrix
N - Column dimension of matrix
PARM - 10-word parameter array

Output

IRR - Error return
0, no error
1, matrix spacing is negative
2, File spacing is negative
4, M*N dimensions greater than buffer size
1500+I, encountered EOF after matrix I while skipping matrices.

Fortran Subprogram COMBUF

Author: G. E. Keylon

Purpose: To put a complex matrix into a buffer prior to writing on file.

Method: The matrix is placed row-wise into a buffer with all of the unused areas of the matrix omitted. All of the real parts are stored in the first part of the buffer then all of the imaginary parts are placed immediately following the real.

Usage: CALL COMBUF (A, K2, M, N, BUFF)

Input:

A	- Array that contains matrix, typed complex
K2	- 2x (row dimension of A)
M	- Number of rows in matrix (not array size)
N	- Number of columns in matrix (not array size)

Output:

BUFF	- Buffer that will contain matrix

Fortran Subprogram READMX

Author: G. E. Keylon

Purpose: To read a matrix from tape or disk file.

Method: A 16-word header record and a matrix record are read from the specified file with BUFFERIN statements. The 16-word header record contains matrix size, name and optional parameters. The matrix is then placed in a given array in correct Fortran storage.

Usage: CALL READMX(INFILE, MXREAD, RANDIN, NFS, NMS, LS, NMR, K, NID, ID, ITYPE, LRS, A, M, N, PARM, IRR)

Input:

- INFILE - Tape number or left justified alphanumeric file name
- MXREAD - Logical variable (not used)
- RANDIN - .T. Random File (not used)
  .F. Sequential File
- NFS - Number of files to space before reading
- NMS - Number of matrices to space before reading
- LS - Level number to space (not used)
- NMR - Random name or number (not used)
- K - Row dimension of array A
  If K≤0 matrix will be left in /RWBUFF/
- NID - Number of words available in ID array

In/Out:

- ID - Identification array
- ITYPE - Real, diagonal, null, mixed, complex

Output:

- LRS - Level number of matrix read (not used)
- A - Array containing matrix
- M - Row dimension of matrix
- N - Column dimension of matrix
- PARM - Array of numerical parameters stored with the matrix in the 16 word header record
- IRR - Error return
  0, no error
  1, matrix spacing is negative
  2, file spacing is negative
  4, matrix dimensions illegal
  5, M .GT. K
  1500 + I, encountered EOF after matrix I while skipping matrices.

Fortran Subprogram CBUFFR

Author: G. E. Keylon

Purpose: To move a complex matrix from a buffer to a Fortran array.

Method: The matrix assumed stored row-wise in the buffer with all of the real parts followed by all of the imaginary parts. The conversion leaves the matrix in the array in typical Fortran storage.

Usage: CALL CBUFFER(A,K2,M,N,BUFF)

Input:

K2	- 2x (row dimension of array A)
M	- Number of rows in matrix (not array size)
N	- Number of columns in matrix (not array size)
BUFF	- Buffer that contains matrix

Output:

A	- Array that will contain matrix in complex storage

3. MAIN CONTROL PROGRAM

Fortran Program CONTROL

Author: G. E. Keylon, G. D. Kramer

Purpose: To control the flow of the program to the various lower level overlay section.

Method: The program has all of the labeled common blocks so that information can be passed from lower levels to this program which will determine the program flow.

Usage: The CONTROL Program is a main routine. It is the only primary overlay section in the program. It calls all of the lower level or secondary overlay sections. It is called from the initial or main overlay section as follows:

```
CALL OVERLAY(6HAFMBOX, 1, 0, 0)
```

Common Input and Output:

This program does not input or create common values. It is the means by which common values are passed between the secondary overlays of the program.

4. DATA INPUT PROCESSOR

Fortran Program DATAPP

Author: G. E. Keylon

Purpose: To read most of the input data and set flags and options for use throughout the program. It prints the title and options for each run.

Method: The title and all the input options are read in. The heading is printed. The options are read under a NAMELIST format and flags set to default options unless read in.

Usage: The DATAPP program is the main program of a secondary overlay of the Mach Box program. It is called as an overlay section as follows:

```
CALL OVERLAY(6HAFMBOX, 1, 1, 0)
```

All input and output is through labeled common blocks.

Common Input:

PREVEX
OMACH
DEFAULT

Common Output:

TITLE	ERR	SYM
PRVGEOM	XKUAL	MTYPEW
PRVMODE	OPLAIC	MTYPET
DIHW	OSPAIC	COPLAN
DIHT	WTGEOM	NSUBDV
XMACH	WTGNAF	NSURF
NKVALS		
XKI		
XKS		
NT5	WTBL	SMOOTH
NT6	PRBOX	NDEG
INTAPE	PRPAIC	DPPCPR
INFSP	PRSAIC	
ISMPLW		GEOCPR
NPLAIC	PRMODS	MODCPR
NSPAIC	PRCOEF	
	PRNW	AICCPR
NOUTP	PRUW	
IOUFSP	PRSW	NWSCPR
	PRVP	
OSAIC	PRBL	GAFCPR
	PRSL	
	PRGNAF	
	PRDCP	
	PRGNAC	

5. GEOMETRY PROCESSOR

Fortran Program GEOMBX

Author: G. D. Kramer

Purpose: To read geometric data from cards and compute all necessary geometric parameters.

Method: Cards F through L are read in this section. As they are read they are printed, then checked for inconsistent or missing data, with suitable diagnostics. The leading and trailing edge data is checked in EDGCHK, then transformed to non-dimensional coordinates. Planform and diaphragm box code patterns are determined in BXCDPF and BXCDI, and optionally printed by PRNTBC. The fractional on-planform portion of all boxes cut by a planform edge is determined by GMAREA, which in turn calls ALPHAC and NTRCEP. If spatial AIC's are necessitated by non-zero dihedral angles or vertical separation of wing and tail, integer arrays MUAIC are determined for each AIC set (C,W,V). These serve as a map, so that only those AIC values needed will be calculated. The MUAIC arrays are computed in PWWAIC and PWTAIC. All resulting arrays are written on scratch file IGEOSC.

Usage: The GEOMBX program is the main program of a secondary overlay. It is called by:

CALL OVERLAY (6HAFMBØX, 1, 2, 0)

Common Input:

OMACH	NSUBDV
TITLE	NSURF
PRVGEOM	MYBW
DIHW	PRBOX
DIHT	GEOCPR
XMACH	

Common Output:

COPLAN	MXBW	MXBT	FSMPLW
XSUBDV	MXBBW	MYBT	ICHORD
NSUBDV	MYBBW	MYBBT	IBOXF
NSUBD2	MXBSW	MXBST	IBOXL
NSUBCN	MYBSW	MYBST	ZLOC
B1	MYBBSW	MYBBST	
B1BETA	IXBW	IXBT	
B1S	XCENTR	IXBST	
B1BTAS	TLAX	CAPL	

WLAX	TLAZ	NSPATK
WLAZ	PSIT	
PSIW		

Arrays output on scratch file IGEOSC:

- IBOXW - Wing box codes (Wing and tail if COPLAN = .TRUE.)
- IBOXT - Tail Box codes
- FEXLOC - Leading edge locations at chord centers
- TEXLOC - Trailing edge locations at chord centers
- ALPHA - Fractional areas of boxes cut by a planform edge
- IJALPH - Locations of cut boxes, of the form $(1000*J+I)_8$
- KPT - Table of contents for the MUAIC arrays (and AIC's)
- MUAIC - Pointer array indicating where contributing boxes will be found for one spatial AIC set.

Fortran Subroutine EDGCHK

Author: G. D. Kramer

Purpose: Given the leading or trailing edge values, to check for illegal combinations.

Method: Either a leading or trailing edge is checked for monotonic increasing y-values, starting at zero. The last trailing edge value is compared with the previous last value. A leading edge is checked for monotonically increasing x-values.

Usage:

```
DIMENSION XEDGE(10), YEDGE(10)

CALL EDGCHK (XEDGE, YEDGE, NEDGE, IEDGE, IRR)
```

Input Parameters:

```
XEDGE  - Array of X-values for edge location points
YEDGE  - Array of Y-values for edge location points
NEDGE  - Number of points to check
IEDGE  - =1, leading edge
         =2, trailing edge
```

Output Parameter:

```
IRR    =0, Successful
       = 1, Non-monotonic y-values
       = 2, Non-monotonic x-values, leading edge only
       = 4, Y-values not starting at zero
       = 8, Tip y-values not agreeing
       Other, additive combination of above
              conditions
```

Fortran Subroutine BXCDPF

Author: G. D. Kramer

Purpose: To generate on-planform box codes for one surface, and store them in a compressed format.

Method: For each (subdivided) chord, the location of the leading edge and trailing edge (FEXLOC, TEXLOC) is determined. Codes for all boxes between those values are then set to 1 in subroutine NCODER. The remainder of the box code array is not changed.

Usage: The subroutine is called by:
CALL BXCDPF(XLE, YLE, NLE, XTE,YTE,NTE, LSROWS, IBOX)

Input Parameters:

$\left.\begin{matrix}XLE\\YLE\end{matrix}\right\} = \left\{\begin{matrix}x\\y\end{matrix}\right\}$ locations of leading edge, measured in n_c, m_c, l_c system

$\left.\begin{matrix}XTE\\YTE\end{matrix}\right\} = \left\{\begin{matrix}x\\y\end{matrix}\right\}$ locations of trailing edge, measured in n_c, m_c, l_c system

$\left.\begin{matrix}NLE\\NTE\end{matrix}\right\}$ = Number of $\left\{\begin{matrix}\text{leading}\\\text{trailing}\end{matrix}\right\}$ edge definition points.

LSROWS = Maximum number of subdivided rows allowed.

In/Out Parameters:

$\left.\begin{matrix}IXBW\\IXBT\end{matrix}\right\}$ = Input: 0 indicates the $\left\{\begin{matrix}\text{wing}\\\text{tail}\end{matrix}\right\}$ is to be done.
Output: Subdivided row of first unsubdivided box center on the surface.

Output Parameters:

IBOX Compressed box codes, 1 for on-planform boxes found, unchanged elsewhere. See Figure 4.

Output Common Parameters:

$MXBS\left\{\begin{matrix}W\\T\end{matrix}\right\}$ Maximum X (aft) extension of the subdivided $\left\{\begin{matrix}\text{wing}\\\text{tail}\end{matrix}\right\}$ pattern

$MYBS\left\{\begin{matrix}W\\T\end{matrix}\right\}$ Maximum Y (outward) extension of the subdivided on-planform $\left\{\begin{matrix}\text{wing}\\\text{tail}\end{matrix}\right\}$ pattern

$MXB\left\{\begin{matrix}W\\T\end{matrix}\right\}$ Maximum X extension of the unsubdivided $\left\{\begin{matrix}\text{wing}\\\text{tail}\end{matrix}\right\}$ pattern

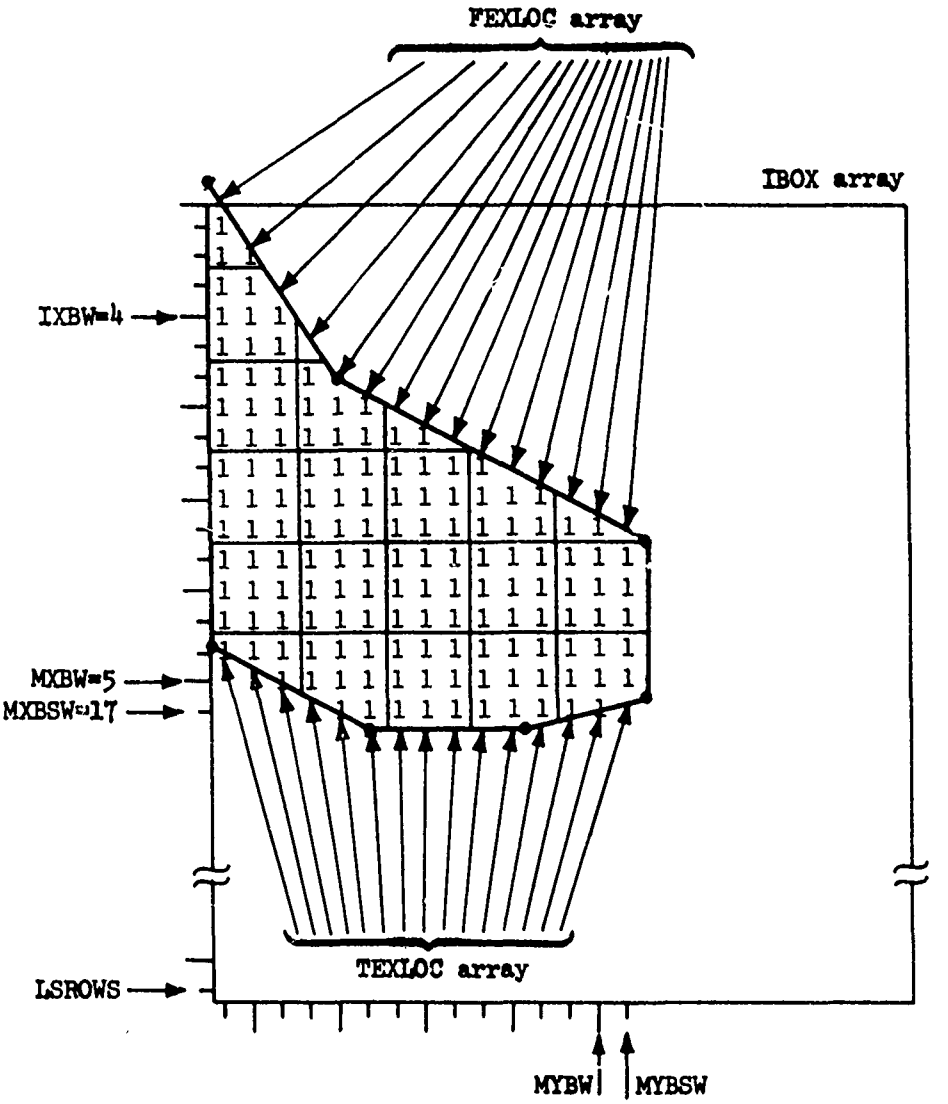


FIGURE 4 Output from BXCDFF, Called for a Wing (NSUBDV=3)

MYB $\left\{\begin{matrix}W\\T\end{matrix}\right\}$ Maximum Y extension of the unsubdivided $\left\{\begin{matrix}\text{wing}\\\text{tail}\end{matrix}\right\}$ pattern

$\left.\begin{matrix}\text{FEXLOC}\\\text{TEXLOC}\end{matrix}\right\} = \left\{\begin{matrix}\text{Leading}\\\text{Trailing}\end{matrix}\right\}$ edge X location at (subdivided) chord centers.

Fortran Subroutine BXCDI

Author: G. D. Kramer

Purpose: Given an array indicating a pattern of on-planform Mach boxes, to determine the associated off-planform diaphragm boxes

Method: Leading edge diaphragm boxes are first determined, followed by wake diaphragm boxes. The tip diaphragm is then determined as a function of the tip chord. For the wing, an integer array is interrogated to determine whether additional wake areas (and tip diaphragm) are needed for wing-tail interference.

Usage: The subroutine is called by:
CALL BXCDI (IWAKE, LSROWS, LSCHDS, IBOX)

Input Parameters:

IWAKE: Array of locations on the wing for aft-most unsubdivided box in each chord affecting a tail surface. Not used for the tail surface, first element = 0

LSROWS: Maximum number of subdivided rows allowed

LSCHDS: Maximum number of subdivided chords allowed

Input/Output

IBOX: Array of subdivided box codes, previously set 1 at planform locations by subroutine BXCDPF. See figure 5.

Common Input

MXBBSW / MXBBST: Maximum X extension of the subdivided {wing / tail} box pattern, including diaphragm

IXBST: X-location of the first subdivided tail row

MYBSW / MYBST: Maximum Y extension of the subdivided planform {wing / tail} pattern

MYBBSW / MYBBST: Maximum Y extension of the subdivided {wing / tail} pattern, including diaphragm

NSUBDV: Number of subdivisions

Common Output

MYBBSW / MYBBST: Modified, if necessary

MYBBW / MYBBT: Maximum Y extension of the unsubdivided {wing / tail} pattern, including diaphragm

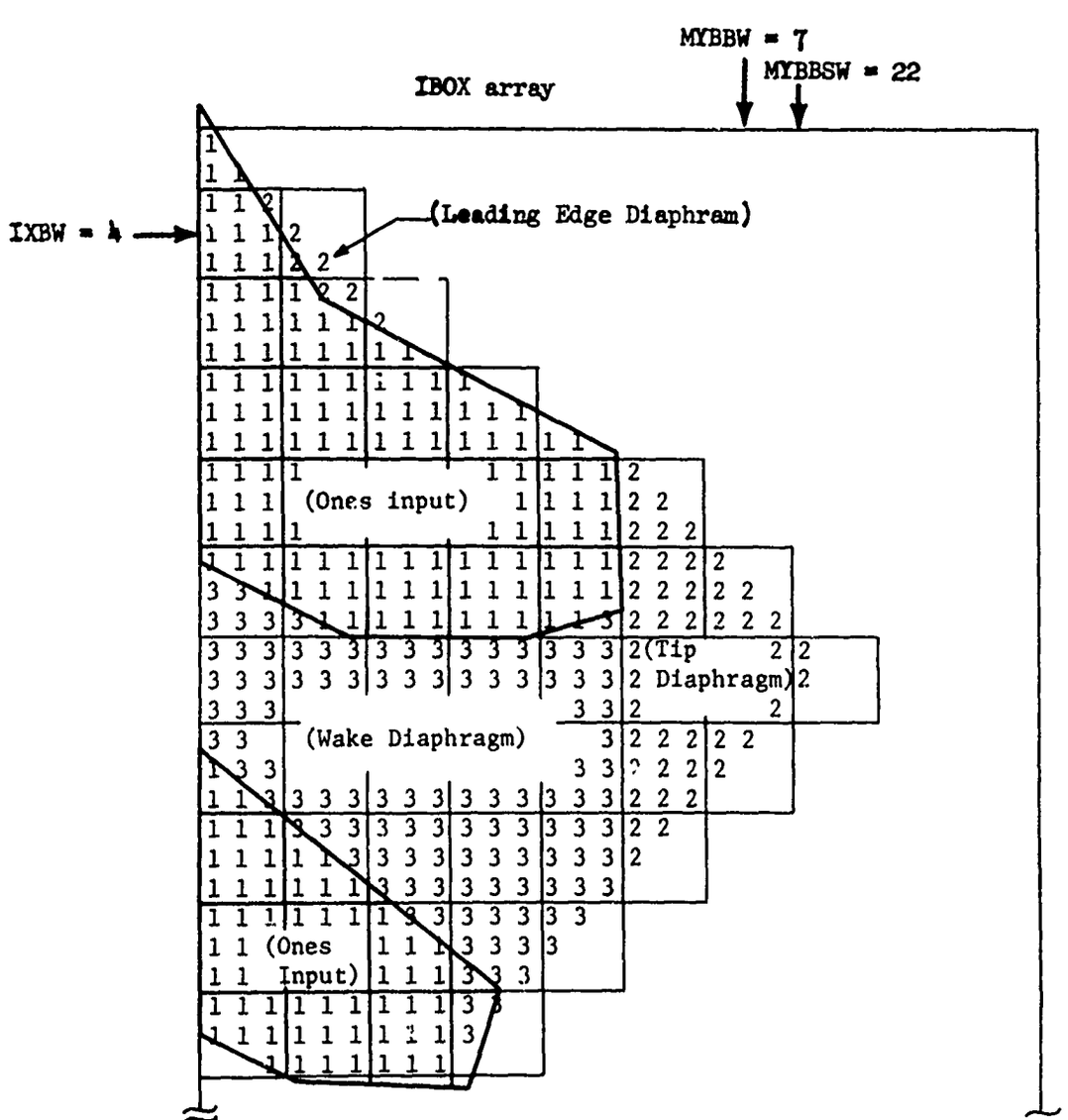


Figure 5 Output from BXCDI, called for a Coplanar Wing and Tail (NSUBDV = 3)

Fortran Subroutine PRNTBC

Author: G. D. Kramer, G. E. Keylon

Purpose: Print the array of box codes, either all values or only unsubdivided box-center values

Method: The compressed box code array is decompressed using subroutine DCODER, one row at a time, and printed. If unsubdivided codes have been requested, only the control point values are printed.

Usage: CALL PRNTBC (IBOX, LBXCD, IROW, MXB, MYB, SUBD)

IBOX	- Box code array
LBXCD	- Row size of box code array
IROW	- First row to print
MXB	- Last row to print
MYB	- Number of chords to print
SUBD	- .T., subdivided box codes desired .F., unsubdivided (control point) box codes desired

Fortran Subroutine PWWAIC

AUTHOR: G. D. Kramer

PURPOSE: Given the box pattern and dihedral angle of the surface, to determine a pointer array (MUAIC) for one chord on the right surface which indicates contributing regions (if any) of the left surface on the given chord.

METHOD: The geometric relationship of the sending surface to the receiving chord is first determined. Then for all rows, from the last receiving box forward to the forward edge of the box pattern, any sending boxes on the left surface are indicated in the MUAIC array.

USAGE: CALL PWWAIC(WING,IBOX,LBXCD,IWAKE,JCOL)

Input Parameters:

WING	.T., wing is being considered. .F., tail is being considered.
IBOX	Array of box codes (IBOXW or IBOXT).
LBXCD	Length of array IBOX.
IWAKE	Array of locations of aft-most box to be considered on the wing. Ignored if WING = .F.
JCOL	Chord being considered (receiving).

Common Input:

PSI $\left\{\begin{matrix}W\\T\end{matrix}\right\}$	Dihedral angle
NSUBDV	Number of subdivisions
XSUBDV	Number of subdivisions, real
NSUBD2	NSUBDV/2
IXBW	Location of first unsubdivided box center.

Output Parameters:

The computed results are returned via common block MUAICS. They are:

SURF	Logical indicator - true means a sending surface was encountered.
MUAIC(2,50)	Unsubdivided row "map" of sending box locations, see Figure 7.
EL	Normal offset of receiving chord from sending surface.
YBAR	Parallel offset of receiving chord.
NROWS	Number of rows considered.

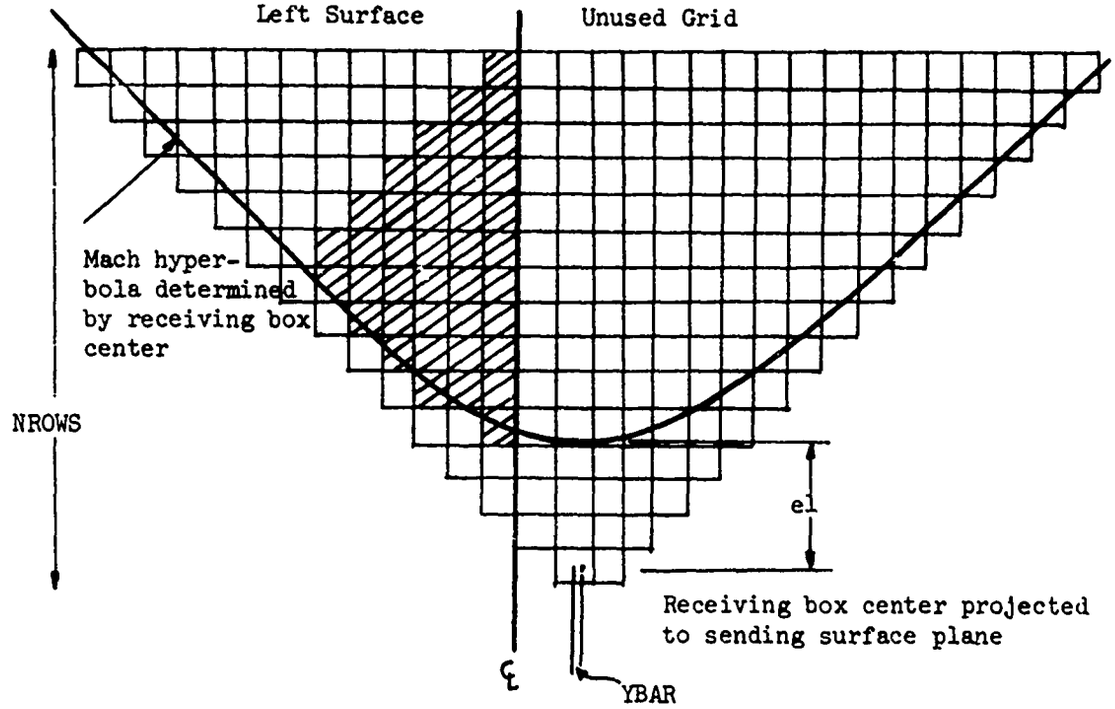


FIGURE 6. Possible Arrangement of Sending Boxes, Left Surface to Right
(Actual sending boxes shaded.)

0	0	0	0	3	2	2	2	2	3	5	7	9	11	13
0	0	0	0	3	4	5	6	7	8	9	10	11	12	13

NROWS = 15

FIGURE 7. MUAIC Array Generated by PWWAIC for Figure 4.

Fortran Subroutine PWTAIC

Author: G. D. Kramer

Purpose: Given the box patterns and dihedral angles of the two surfaces, to determine pointer arrays (MUAIC arrays) for the right wing and the left wing contributing regions to a desired tail chord.

Method:] The geometric relationship of the sending surfaces to the receiving chord is first determined. Then for all rows, from the last receiving box forward to the forward edge of the sending vox patterns, any sending boxes are indicated in the MUAIC arrays.

Usage: The subroutine is called, after suitable setup, by:

CALL PWTAIC (IBOXW, LBXCDW, IROW, JCOL, CAPLL, YMUVSP)

Input Parameters:

IBOXW - Array of wing box codes
LBXCDW - Row dimension of IBOXW
IROW - Unsubdivided receiving row number
JCOL - Unsubdivided receiving chord number
CAPLL - Vertical Separation of sending center line receiving center line
YMUVSP - $\bar{\mu}$ contribution due to vertical separation
= CAPLL* sin(Ψ_w)

Input Common Variables

PSIDIF	= $\phi_T - \phi_w$	PSIT
NSUBDV		FEXLOC
PSIW		TEXLOC
MYBBW		SYM
MYBSW		
IXBW		

Output Parameters

The computed results are returned via common block MUAICS. They are:

{SURF / SURFL} = .T., Contributing boxes were found on the {right / left} wing
= .F., No contributions were found

{MUAIC / MUAICL}	Map of contributing boxes on the {right / left} wing, see Figure 7.
{EL / ELL}	The normal offset between the wing {right / left} plane and the receiving point
{YBAR / YBARL}	The paralled offset between the nearest chord center on the wing {right / left} box pattern and the receiving point
{NROWS / NROWSL}	Number of rows covered by the MUAIC array for the {right / left} wing contributions

Fortran Subroutine GMAREA

AUTHOR: G. E. Keylon, G. D. Kramer

PURPOSE: To compute the fractional on-planform portion of all planform boxes which are cut by a planform edge.

METHOD: For each chord, the X coordinates of the left side intercept, right side intercept, and any kinks within the box width are determined by subroutine NTRCEP for each planform edge cut by the chord (wing and/or tail). Then for each planform box on the chord, the routine determines whether any edge cuts the box or causes a contribution to the box area. For any affected box, subroutine ALPHAC is called to compute the fractional area, which is then stored in array ALPH, and its location is stored in array IJALPH as (J * 512 + I). The fraction may be greater than one, since it includes the planform area of any chordwise adjacent box whose center is off planform.

USAGE: The routine is called by:

CALL GMAREA (IBOX, LBXCD, WING, ALPHA, IJALPH, NALPH)

Input Parameters:

IBOX Box code array
LBVCD Size of box code array
WING .T., Wing or coplanar case
.F., Tail

Input Common Parameters:

COPLAN	MXBT	NSURP	XWLE	XTLE
FEXLOC	MXBW	NWLE	YWLE	YTLE
TEXLOC	MYBT	NWTE	XWTE	XTTE
IXBT	MYBW	NTLE	YWTE	YTTE
IXBW	NSUBDV	NTTE		

Output Parameters:

ALPHA Array of area multipliers
IJALPH Array of corresponding IJ locations, as (J * 512 +I)
NALPH Number of fractions calculated

Fortran Subroutine NTRCEP

AUTHOR: G. E. Keylon

PURPOSE: To compute the X coordinates of the intersections of a planform edge with the sides and center of a chord.

METHOD: The routine determines in which interval of the edge the desired point lies. The x-coordinate of the point is then obtained from the standard two point equation of a line. This is done for all three points.

USAGE: The routine is called by:

CALL NTRCEP (J, YEDG, XEDG, L1, C1, R1, NBK1, K1, IDEX)

Input Parameters:

J = Chord number
YEDG, XEDG = Arrays of $\begin{Bmatrix} Y \\ X \end{Bmatrix}$ locations of the edge definition points
IDEX = 1, leading edge
2, trailing edge

Common Input Values (from local common block/LAREA/)

LEFT = Y-location of the left side of the chord
RIGHT = Y-location of the right side of the chord

Output Parameters

L1 = X coordinate of left side intersection
C1 = X coordinate of center line intersection
R1 = X coordinate of right side intersection

NBK1 = Number of edge definition points encountered between the left and right sides of the chord.

K1 = 0 if no edge definition point lies between the left and right sides of the chord.
= The first (leftmost) edge definition point number lying within the chord.

Subroutine ALPHAC

AUTHOR: G. E. Keylon, G. D. Kramer

PURPOSE: To compute the on-planform area of a box which is partically off the planform or which must include area from neighboring off-planform box(es) cut by a planform edge.

METHOD: If the box is the first box on the chord, or the last box on the chord, the box is divided spanwise into a series of trapezoids (or triangles) determined by planform edge definition points occurring within the chord. The areas of these trapezoids are then added, yielding α.

If the box is an interior box which is cut by one or more planform edge segments, the area is first set to one, then the area of the off-planform corner(s) determined as trapezoids or triangles is subtracted.

USAGE: The routine is called by

CALL ALPHAC (X, XLED, YLED, XTED, YTED, L1, C1, R1, NBK1, K1, L2, C2, R2, NBK2, K2, AREA)

Input Paramters:

X = X coordinate of box center

XLED, YLED = Planform leading edge definition points

XTED, YTED = Planform trailing edge definition points

L1, C1, R1 = {Left, Center, Right} Chord edge intersections with the planform leading edge

NBK1 = Number of planform leading edge definition points within the chord

K1 = First leading edge definition point within chord

L2, C2, R2, NBK2, K2 = Same as above for trailing edge

Output Value:

AREA = The desired box area, α

6. MODAL DATA PROCESSOR

Fortran Program MODES

AUTHOR: G. E. Keylon

PURPOSE: To read the modal input data, compute it by a least squares surface fitting routine or evaluate a polynomial equation with coefficients supplied by input and store this information on a scratch file.

METHOD: The information needed to determine the mode shapes is read in. The planform information is read from a scratch file created in the geometry section. The program then computes or reads the modal data at control points, orders the data and writes the data on a scratch file for use in following sections.

Subroutine ROPER is used to compute row pointers for storing box center modal values row-wise. Modal input from tape is handled by TAPMOD. If modal input option 2 was specified, FITTER is called to compute the surface fit polynomial coefficients. PRECOF is called if the coefficients from option 1 or 2 are to be printed. The coefficients are saved on a scratch file for future cycles, and the polynomial is evaluated at box centers, with the results stored on scratch file MODESC.

The program also has an option to read an array of Thickness slope function values derived from "Piston Theory" calculations. These values are input to an equation that computes the thickness correction factor.

$$\bar{\bar{Z}}_\tau(x,y) = 1 + \frac{\gamma+1}{2} \cdot M \frac{\partial z_\tau}{\partial x} \qquad (1)$$

where γ is ratio of specific heats for a perfect gas (1.40)

M is Mach number.

$\partial z_\tau / \partial x$ is the thickness slope function values.

$\bar{\bar{Z}}_\tau(X,Y)$ is the thickness correction factor.

Input Methods:

(1) Polynomial Coefficient Input

The degree of a surface polynomial equation and the coefficients are read in. The deflection is then computed by the following polynomial equation:

$$\text{Deflection} = a_{00} + \sum_{i=1}^{\#\text{ of degrees}} \left(a_{i0} x^i y^0 + \ldots + a_{0i} x^0 y^i \right) \quad (2)$$

where, point (X,Y) is the coordinates of a box center in the planform local coordinate system, and a is the array of polynomial coefficients read in. The slope is computed by taking the derivative of the deflection in the X direction.

$$\text{Slope} = \sum_{i=0}^{\#\text{ of degrees}} d\left(a_{i0} x^i y^0 + \ldots + a_{0i} x^0 y^i \right) / dx \quad (3)$$

$$= \sum_{i=1}^{\#\text{ of degrees}} \left(i a_{i0} x^{i-1} y^0 + \cdots + a_{1i} y^i \right)$$

These equations are used to compute the deflection and slopes for all the planform boxes. The array of modal values is stored on a scratch file for use in the velocity potential and generalized forces sections of the program.

(2) Interpolation

The degree of a surface polynomial equation, the number of locations where deflections are to be given and the locations and deflections are read in. The deflections are perpendicular to the surface and the (X,Y) locations are input in the planform local coordinate system. The program uses this data to fit a surface polynomial expression in the least squares error approximation. The routine that performs the surface fit is subroutine FITTER. This routine sets up an upper triangular, augmented matrix that represents the set of simultaneous linear equations formed by taking the partial derivatives of each deviation equation squared and setting it to zero. It then solves the set of simultaneous linear equations by using the Choleski square root method given in Reference 1. The solution is an array of polynomial coefficients that are used to compute the modal values in the same manner as method (1).

(3) Modal Values at Box Centers

The values of the deflections and slopes are read in from cards or tape and stored on a scratch file for use in the velocity potential and generalized forces sections of the program. The values are stored in order of boxes within chord, and chords within planform. The order is fore to aft boxes, center most to tip chord and wing before tail. For card input, each chord begins on a new card. All of the mode shape for the wing will be read followed by all of the mode shapes for the tail.

USAGE: The MODES program is the main program of a secondary overlay of the Mach Box program. It is called as follows:

```
CALL OVERLAY (6HAFMBØX, 1, 3, 0)
```

Input:

Uses labeled common blocks:

```
/PROBLM/
/GEOMTY/
/GEOM2/
/FILES/
/IOCONT/
/TAPEIO/
/MODES/
/RWBUFF/
```

Uses the following files:

IGEOSC

Output:

Output is stored on file:

MODESC

Fortran Subprogram ROPER

AUTHOR: G. E. Keylon

PURPOSE: To compute the row pointers indicating location of planform boxes.

METHOD: The subprogram uses the column pointers and determines the row pointers. The subprogram will also calculate pointers for a tail surface with overlapped planform and store the pointers after the first planform pointers.

USAGE: CALL ROPER

General labeled common blocks used:

/GEOMTY/
/GEOM2/

LOCAL labeled common blocks used:

/INDEX/ IS(100), NOC(100), JS(50), JOC(50)

Common Input:

IS(J) - The ith index of the first planform box on chord J.

NOC(J) - The number of planform boxes on chord J.

Common Output:

JS(I) - The jth index of the first planform box on row I.

JOC(I) - The number of planform boxes on row I.

Fortran Subprogram FITTER

AUTHOR: G. E. Keylon

PURPOSE: To fit a surface in the least squares sense through a set of data points.

METHOD: The fitter routine is passed a set of ordered triplets and the degree of polynomial to fit. It is also given a scale factor if needed to scale the data to prevent the occurrence of arithmatic overflow or underflow. The program can fit real or complex data. The system of simultaneous linear equations that must be solved for employs the Choleski square root method (see Ref. 1). If the polynomial exceeds the maximum capability in either X or Y direction that degree is held and the other direction is allowed to use the full degree.

USAGE: CALL FITTER (M, N, X, Y, Z, C, CN, IDIM)

Input:

M - degree of polynomial equation
N - number of data points to fit curve through
X - Array of X coordinates
Y - Array of Y coordinates
Z - Array of Z coordinates
CN - scale factor
IDIM - Indicator of real or complex function
= 1, function to fit is real
2, function to fit is complex

Output:

C - Output polynomial coefficient array.

Fortran Subprogram MODOUT

AUTHOR: G. E. Keylon

PURPOSE: To print the mode shapes in a manner that the user can readily determine Mach box values of deflections and slopes.

METHOD: The mode shapes are rearranged in a print array so that one row or part of a row will be printed at a time. If there are more than 15 chords on the planform the program prints information for 15 chords, for all rows, and then prints for the next 15 chords until all information has been printed. The values may be scaled before printing to allow values to be printed under F mode Fortran format control. The scaling factor will be indicated in the title.

USAGE: CALL MODOUT (DEFSL, JS, JOC, NROWS, NM, IOVLAP)

Input:

DEFSL - Array of mode shapes
DEFSL(1,I) = deflection
DEFSL(2,I) = slope
JS - Array of pointers to first planform box on each row
JOC - Array of counters for the number of planform boxes on each row.
NROWS - number of rows
NM - Mode shape number
IOVLAP - Number of boxes of overlap between planforms for non-coplanar surfaces.

Output:

None

Fortran Subprogram PRECOF

AUTHOR: G. E. Keylon

PURPOSE: To print the polynomial coefficients used in evaluating mode shapes.

METHOD: The coefficients are printed with each coefficient having over it the corresponding powers of X and Y labeled. All the coefficients for a total power will on one line (i.e., line 1 - 0 power, line 2 - first power, line 3 - second power etc.).

USAGE: CALL PRECOF(IDEG, A, IFR)

Input:

Labeled common block /FILES/

IDEG - Degree of polynomial equation
A - Array of coefficients
IFR - Flag indicating how coefficients are obtained.
= 1, read from cards
= 2, computed by least squares surface fit.

Output:

None

7. AERODYNAMIC INFLUENCE COEFFICIENTS SECTION

Fortran Program VICMAIN

AUTHOR: G. E. Keylon

PURPOSE: To determine all aerodynamics influence coefficients (AIC's) that must be computed or retrieved for a specified reduced frequency.

METHOD: A parameter array is read from the geometry scratch file for each spatial AIC that is needed. The program then determines if an array already exists on permanent tape storage. If it exists the array is read in, expanded if necessary, and stored on scratch file IAICSC if spatial, or in blank common if planar. If calculation is necessary, subroutine KERNEL is called to control the actual computations. KERNEL in turn calls ROMBER to do the integrations of FUNCT and VFUNC.

USAGE: The VICMAIN program is the main program of a secondary overlay of the Mach Box program. It is called as follows:

```
CALL OVERLAY (6HAFMBØX 1, 4, 0)
```

Input:

Uses labeled common blocks

```
/KERN/
/KVAL/
/PROBLM/
/FILES/
/GEOMTY/
/IOCONT/
/ARRAYS/
/RWBUFF/
/TAPEIO/
```

Uses the following files

IGEOSC, OSPAIC (optional), OPLAIC (optional)

Output:

Output is stored on files:

NPLAIC, NSPAIC, IAICSC (all optional)

Fortran Subprogram KERNEL

AUTHOR: G. E. Keylon

PURPOSE: To determine the boxes to be integrated and the limits of integration prior to calling the integration routine.

METHOD: The program determines from a parameter array from the geometry scratch file, the intersection of the Mach cone with the planform boxes it is attempting to integrate. It determines what boxes on a row are to be integrated and breaks each box up into a set of integrable limits. It then passes the limits of integration to subroutine ROMBER for integration by the Romberg integration method described in Reference 2.

Box Patterns and Limits:

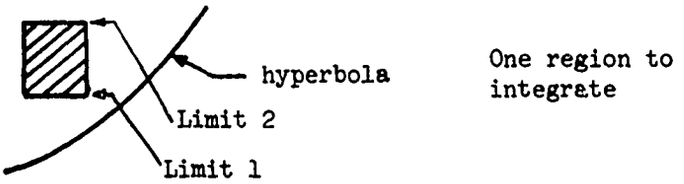
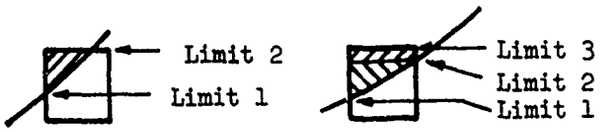
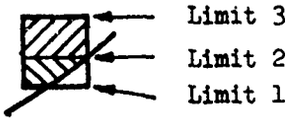


FIGURE 8 AIC Integration, Full Box



One region to integrate

Two regions to integrate



Two regions to integrate

FIGURE 9 AIC Integration Edge Boxes

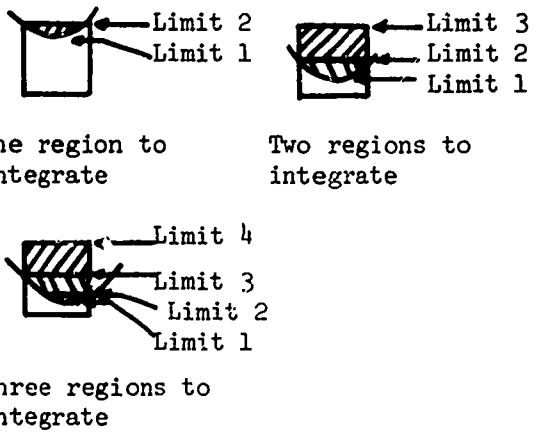


FIGURE 10 AIC Integration Apex Boxes

Box patterns and limits for boxes cut on the left side by the Mach hyperbola are computed in a like manner.

The functions integrated by subroutine ROMBER are those for the velocity potential aerodynamic influence coefficients ($C_{\bar{\nu}\bar{\mu}\bar{\lambda}}$), the upwash aerodynamic influence coefficients ($W_{\bar{\nu},\bar{\mu}\bar{\lambda}}$), and the sidewash aerodynamic influence coefficients ($V_{\bar{\nu},\bar{\mu},\bar{\lambda}}$).

The equations for $C_{\bar{\nu}\bar{\mu}\bar{\lambda}}$ and $W_{\bar{\nu}\bar{\mu}\bar{\lambda}}$ are:

$$C_{\bar{\nu}\bar{\mu}\bar{\lambda}} = -\frac{1}{\pi}\int_{\bar{\xi}_l}^{\bar{\xi}_u} e^{-i\bar{k}_1\bar{\xi}}\left\{J_0\left(\frac{\bar{k}_1}{M}\sqrt{\bar{\xi}^2-\ell^2}\right)\left[\sin^{-1}\left(\frac{\bar{\eta}_u}{\sqrt{\bar{\xi}^2-\ell^2}}\right)\right.\right.$$

$$\left.-\sin^{-1}\left(\frac{\bar{\eta}_L}{\sqrt{\bar{\xi}^2-\ell^2}}\right)\right]+\sum_{r=1}^{\infty}\frac{(-1)^r}{r}J_{2r}\left(\frac{\bar{k}_1}{M}\sqrt{\bar{\xi}^2-\ell^2}\right)$$

$$\left.\left[\sin\left(2r\sin^{-1}\left(\frac{\bar{\eta}_u}{\sqrt{\bar{\xi}^2-\ell^2}}\right)\right)-\sin\left(2r\sin^{-1}\left(\frac{\bar{\eta}_L}{\sqrt{\bar{\xi}^2-\ell^2}}\right)\right)\right]\right\}d\bar{\xi}$$

$$W_{\bar{\nu}\bar{\mu}\bar{\lambda}} = \frac{\ell}{\pi}\left[\int_{\bar{\xi}_\ell}^{\bar{\xi}_u} e^{-i\bar{k}_1\bar{\xi}}\left\{J_0\left(\frac{\bar{k}_1}{M}\sqrt{\bar{\xi}^2-\ell^2}\right)\left[\sin^{-1}\left(\frac{\bar{\eta}_u}{\sqrt{\bar{\xi}^2-\ell^2}}\right)-\right.\right.\right.$$

$$\left.\left.\left.\sin^{-1}\left(\frac{\bar{\eta}_L}{\sqrt{\bar{\xi}^2-\ell^2}}\right)\right]+\sum_{r=1}^{\infty}\frac{(-1)^r}{r}J_{2r}\left(\frac{\bar{k}_1}{M}\sqrt{\bar{\xi}^2-\ell^2}\right)\cdot\right.\right.$$

$$\left.\left.\left[\sin\left(2r\sin^{-1}\left(\frac{\bar{\eta}_u}{\sqrt{\bar{\xi}^2-\ell^2}}\right)\right)-\sin\left(2r\sin^{-1}\left(\frac{\bar{\eta}_L}{\sqrt{\bar{\xi}^2-\ell^2}}\right)\right)\right]\right\}\frac{1+i\bar{k}_1\bar{\xi}}{\bar{\xi}^2}\,d\bar{\xi}$$

$$+\left|\frac{e^{-i\bar{k}_1\bar{\xi}}}{\bar{\xi}}\left\{J_0\left(\frac{\bar{k}_1}{M}\sqrt{\bar{\xi}^2-\ell^2}\right)\left[\sin^{-1}\left(\frac{\bar{\eta}_u}{\sqrt{\bar{\xi}^2-\ell^2}}\right)-\sin^{-1}\left(\frac{\bar{\eta}_L}{\sqrt{\bar{\xi}^2-\ell^2}}\right)\right]\right.\right.$$

$$\left.\left.+\sum_{r=1}^{\infty}\frac{(-1)^r}{r}J_{2r}\left(\frac{\bar{k}_1}{M}\sqrt{\bar{\xi}^2-\ell^2}\right)\left[\sin\left(2r\sin^{-1}\left(\frac{\bar{\eta}_u}{\sqrt{\bar{\xi}^2-\ell^2}}\right)\right)\right.\right.\right.$$

$$\left.\left.\left.-\sin\left(2r\sin^{-1}\left(\frac{\bar{\eta}_L}{\sqrt{\bar{\xi}^2-\ell^2}}\right)\right)\right]\right\}\right|_{\bar{\xi}_\ell}^{\bar{\xi}_u}+e^{-i\bar{k}_1\bar{\xi}}\,\frac{\pi}{\ell}\Bigg] \qquad (5)$$

The $C_{\bar{\nu}\bar{\mu}\bar{\lambda}}$ equations is valid for all types of boxes, which are shown in Figures 8, 9, and 10. The $W_{\bar{\nu}\bar{\mu}\bar{\lambda}}$ equation, as written, is valid for the region of an apex box shown in Figure 10, that has the hyperbola as a boundary on both sides. The last term is zero for regions that have the hyperbola as a boundary for one side and the box edge as the other side boundary. The last term and the terms evaluated at the integration limits are zero for full boxes or regions bounded on both sides by the box edges. The values of the integrand used in ROMBER are computed by subroutine FUNCT which also calls subroutines RANGE and BESSEL to evaluate the Bessel functions.

The function $V_{\bar{\nu}\bar{\mu}\bar{\lambda}}$ is considerably different and holds for all regions to be integrated. The evaluation of the integral is done by subroutine VFUNC. The equation is:

$$V_{\bar{\nu}\bar{\mu}\bar{\lambda}} = -\frac{M}{\pi \bar{k}_1}\left[\left|\frac{e^{-i\bar{k}_1\bar{\xi}}}{\bar{\xi}}\,\frac{1+i\bar{k}_1\bar{\xi}}{\bar{\xi}^2}\left(\sin\left(\frac{\bar{k}_1}{M}\sqrt{\bar{\xi}^2-\bar{\eta}_u^2-\ell^2}\right)\right.\right.\right.$$

$$\left.\left.\left.-\sin\left(\frac{\bar{k}_1}{M}\sqrt{\bar{\xi}^2-\bar{\eta}_L^2-\ell^2}\right)\right)\right|_{\bar{\xi}_L}^{\bar{\xi}_u} + \int_{\bar{\xi}_L}^{\bar{\xi}_u}\left[e^{-i\bar{k}_1\bar{\xi}}\,\frac{1+i\bar{k}_1\bar{\xi}}{\bar{\xi}^2}\right.\right.$$

$$\left.\left.\left(\sin\left(\frac{\bar{k}_1}{M}\sqrt{\bar{\xi}^2-\bar{\eta}_u^2-\ell^2}\right)-\sin\left(\frac{\bar{k}_1}{M}\sqrt{\bar{\xi}^2-\bar{\eta}_L^2-\ell^2}\right)\right)\right]\,d\bar{\xi} \qquad (6)$$

For cases where $\bar{k}_1 = 0$, the equation becomes

$$V_{\nu\mu\lambda} = -\frac{1}{\pi}\left|\left[\cosh^{-1}\frac{\bar{\xi}}{\sqrt{\bar{\eta}_u^2+\bar{\lambda}^2}} - \cosh^{-1}\frac{\bar{\xi}}{\sqrt{\bar{\eta}_L^2+\bar{\lambda}^2}}\right]\right|_{\xi_L}^{\xi_u} \qquad (7)$$

USAGE: CALL KERNEL(XMACH,K1,ERR,C,W,V)

Input:

XMACH	Mach number
K1	Reduced frequency
ERR	Convergence criteria (relative not absolute)

Labeled Common Block /VICPAR/

Output:

C	Velocity potential aerodynamic influence coefficients.
W	Upwash aerodynamic influence coefficients.
V	Sidewash aerodynamic influence coefficients.

Fortran Subprogram ROMBER

AUTHOR: G. E. Keylon

PURPOSE: To integrate the aerodynamic influence coefficient functions.

METHOD: The program uses the Romberg integration technique (Ref. 2). The technique is a modified trapezoidal area method with an extrapolation method added. For analytical cases the sidewash aerodynamic influence coefficient will be solved by an analytic equation, not by numerical approximation.

USAGE: CALL ROMBER (XILL, XILU, IUC, ERR, IFLAG, K1BAR, YMUBAR, EL, XMACH C, W, V)

Input:

XILL - Lower limit of integration
XILU - Upper limit of integration
IUC - Flag indicating type of box or edge condition of interval to be integrated = 0, full box
1, left side of box is edge of Mach hyperbola.
2, right side of box is edge of Mach hyperbola.
3, both sides of box are edges of Mach hyperbola.

ERR - Convergence criteria (relative, not absolute)
IFLAG - Indicator of real or imaginary parts
= 0, real part
= 1, imaginary part
K1BAR - Function of reduced frequency and Mach number, $= \frac{K_1 M^2}{(M^2 - 1)}$

YMUBAR - Parallel offset of pulse sending box.
EL - Normal offset of receiving point from sending plane.
XMACH - Mach number

Output:

C - Velocity potential aerodynamics influence coefficient, $C_{\bar{\nu}\bar{\mu}\bar{\lambda}}$

W - Upwash aerodynamic influence coefficient, $W_{\bar{\nu}\bar{\mu}\bar{\lambda}}$

V - Sidewash aerodynamic influence coefficient, $V_{\bar{\nu}\bar{\mu}\bar{\lambda}}$

Fortran Subprogram FUNCT

AUTHOR: G. E. Keylon

PURPOSE: To evaluate the velocity potential and upwash acrodynamic influence coefficient functions for a set of independent variables.

METHOD: An array XI of independent variables is passed to the program through the calling sequence. The program evaluates the function at each point first checking for boundary conditions where the function approaches a singularity. Routines to find the range of and value of Bessel functions are called in the evaluation of the function.

USAGE: CALL FUNCT (K, XI, FXIC, FXIW, IFLAG, K1BAR, EL, YMUBAR, IUC, XMACH, BESSY)

Input:

K - Number of functions to evaluate
XI - Array of independent variables
IFLAG - Indicator of real or imaginary parts
= 0, real part
= 1, imaginary part
K1BAR - Function of reduced frequency and Mach number, $K_1 M'/(M'-1)$
EL - Normal offset of receiving point from sending plane.
YMUBAR - Parallel offset of pulse sending box.
IUC - Flag indicating type of box or edge condition of interval to be integrated.
XMACH - Mach number

Output:

FXIC - Function values for Velocity Potential AIC.
FXIW - Function values for Upwash AIC.
BESSY - Evaluation at end points for upwash AIC.

Fortran Subprogram BESSEL

AUTHOR: G. E. Keylon

PURPOSE: To evaluate the Bessel functions for a given argument over a range of orders.

METHOD: The argument and range (# of terms or order) is passed to the the routine. The routine then calculates the required terms and places them in an array and returns.

USAGE: CALL BESSEL (K12, AV, NA)

Input:

K12 - The argument, a function of independent variable, Mach number and reduced frequency.

NA - Highest order of the Bessel function to be evaluated.

Output:

AV - Array containing the Bessel functions.

Fortran Subprogram RANGE

AUTHOR: G. E. Keylon

PURPOSE: To determine the range (or order) of a Bessel function with a given argument.

METHOD: An order, or equation for an order, is given for various increments of arguments. This routine determines which interval the argument is in and computes the order.

USAGE: CALL RANGE (K12, NA)

Input:

K12 - The argument, function of independent variable, Mach number and reduced frequency.

Output:

NA - Highest order of the Bessel function to be evaluated.

Fortran Subprogram VFUNC

AUTHOR: G. E. Keylon

PURPOSE: To evaluate the sidewash aerodynamic influence coefficient function for a set of independent variables.

METHOD: An array of independent variables is passed to the program through the calling sequence. The program evaluates the function at each point, first checking for boundary conditions where the function approaches a singularity.

USAGE: CALL VFUNC (K, XI, FXIV, IFLAG, K1BAR, EL, YMUBAR, INC, XMACH, IND, VT)

Input:

- K - Number of values to calculate
- XI - Array of independent variables
- IFLAG - Flag indicating real or complex part
  - = 0, real part
  - = 1, imaginary part
- K1BAR - Function of reduced frequency and Mach number, $K_1M^2/(M^2-1)$
- EL - Normal offset of receiving box above sending plane.
- YMUBAR - Parallel offset of pulse sending box.
- INC - Flag indicating type of box or edge condition of interval to be integrated.
- XMACH - Mach number
- IND - Indicator to calculate VT terms
  - = 0, do not calculate
  - = 1, calculate

Output:

- FXIV - Function values for sidewash AIC.
- VT - Extra terms calculated at the limits of integration.

8. NORMAL-WASHES AND VELOCITY POTENTIALS

Fortran Program NWVLPT

AUTHOR: G. D. Kramer

PURPOSE: To compute normal washes and associated velocity potentials for each oscillatory mode shape at box centers. Wake sampling of upwash, sidewash and longitudinal wash is also provided.

METHOD: The necessary box patterns and other geometric items are first read in from the scratch file IGEOSC. The mode shape and velocity potential pointer array IPNTRM is read from scratch file MODESC, and a pointer array for normal-washes, IPNTDW, is generated by subroutine POINTR. These pointer arrays serve to associate a box location in a sparsely filled rectangular array with the corresponding mode, velocity potential or normal wash value in a singly dimensioned, densely filled array.

A loop on mode shapes is entered next. The box center deflections and shapes are read from MODESC into array DEFSL. Subroutine VELPOT is called for the wing to compute N_{RUW}, N_{RLW}, and $\Delta\bar{\bar{\phi}}$ at box centers, and trailing edge $\Delta\bar{\bar{\phi}}$ values in array TVP. If a tail is being analyzed as well, the contributing wing normal-washes are determined and VELPOT is called again. Optional printing of N_{RUW}, etc. and $\Delta\bar{\bar{\phi}}$ is done in routine PRINTR.

If sampling of wake washes is desired, subroutine SMPLW is called to compute and print these results.

The $\Delta\bar{\bar{\phi}}$ array VELPOT and the TVP array are written on scratch file IVPSC for each mode shape.

USAGE: The DWVLPT program is the main program of a secondary overlay of the Mach box program. It is called as follows:

CALL OVERLAY (6ØAFMBØX, 1, 5, 0)

Input: Uses labelled common blocks

/CONTRL/	/FILES/
/PROBLM/	/IOCONT/
/GEOMTY/	/TAPEIO/
/GEOM2/	/MODES/
/KERN/	/ARRAYS/
/KVAL/	/SAMPLW/

Uses scratch files

IGEOSC
IMODESC

Fortran Subroutine POINTR

AUTHOR: G. E. Keylon, G. D. Kramer

PURPOSE: To generate part or all of a pointer array which indexes another array of box associated values (modes, normal-washes, etc.) stored compactly, row-wise.

METHOD: The box codes are scanned to determine the first box of interest and the number of boxes of interest on each row. From this, the pointer array is generated such that IPNTR(1,i) = the location of the first box value for row i, and IPNTR (2, i) = the chord number of the first box value for row i.

USAGE: The routine is called by:

```
DIMENSION IBOX (LBXCD, # chords/10), IPNTR (2, MXIR)
LOGICAL DIAPH, SUBD, WING

CALL POINTR (IX, MX, MYB, IOVLAP, SUBD, DIAPH, IBOX, LBXCD, MXIR,
             IPOINT, IPNTIN, IPNTR)
```

Input Parameters:

IX = First row of the box pattern for which the pointer array is desired.
MX = Number of rows desired.
MYB = Maximum row length
IOVLAP = Number of rows to allow for overlap (tail only).
SUBD = .T., a pointer array for subdivided boxes is desired
= .F., only unsubdivided box information is desired.
DIAPH = .T., boxes in diaphragm areas are to be included.
= .F., only on-planform boxes are of interest though space may be left within a row if imbedded diaphragm areas occur.
IBOX = Array of subdivided box codes generated in the geometry section.
LBXCD = Length of box code array.
MXIR = Length of IPNTR array, used to control end-around buildup of the array.
IPOINT = Value to be used for first pointer; 1 if IX=1, else the next location available in the array "pointed to" for row IX.

In/out Parameters:

IPNTIN = Location of next available cell in the IPNTR array. This will be incremented for each row processed until MXIR is reached, when it is reset to 1.

IPNTR (2, MXIR) = The pointer array, see Method above.

FORTRAN Subroutine GETAIC

Author: G. D. Kramer

Purpose: To get the desired Aerodynamic Influence Coefficient (AIC) arrays from scratch file IAICSC.

Method: From the calling sequence, the location of the desired AIC array(s) is determined. If they are in core, the routine returns. If there are none, the error flag is set. Otherwise, the disk file is positioned, and the desired arrays are read into local common block AICS.

Usage: EL, YBAR, NROWS, MUAIC (2,50) are in a common block, MUAICS for output from GETAIC
NWWAIC, NTTAIC, NRWTAIC, NLWTAIC and PAIC (4,50) are in a common block /PAICS/, for use by the routine.

CALL GETAIC (JUCENT, ITYPE, ICODE, IR)

Input Parameters:

JUCENT = receiving chord number
ITPE = 1, 2, 3, 4 indicating wing-wing, tail-tail, right-wing-tail, or left-wing-tail AIC's desired
ICODE = 0, C,V,W desired
1, V,W desired
2, V desired

Common Input:

NWWK, NTTK, NRWTK, NLWTK = Number of AIC arrays available for influence. (wing-wing, tail-tail, right wing-tail, left wing-tail)

PAIC (4,50) = Table of contents for the AIC's. PAIC (I,J) indicates where the AIC's for the Ith form of influence (see above) on the Jth chord are located.

Output Parameters:

IR = 0, Success
1, C not found
2, C and W not found
3, Nothing found

Common Output:

C = $C_{\nu\mu\omega}$
W = $W_{\nu\mu\omega}$
V = $V_{\nu\mu\omega}$

Fortran Subroutine VELPOT

AUTHOR: G. D. Kramer

PURPOSE: To compute normal wash and velocity potential values for one mode shape.

METHOD: This routine calculates the following equations:

$$\frac{D\bar{f}_j^{n,m}}{Dt} = \left[i k_1 f_j^{n,m} + b_1 \frac{\partial f_j^{n,m}}{\partial x} \right] \tag{8}$$

(1) For the wing:

$$N_{RUW}^{n,m} = \frac{D\bar{f}_j}{Dt} - \hat{N}_{\substack{RUW \\ LUW}}^{n,m} \quad , \quad N_{RLW}^{n,m} = -\frac{D\bar{f}_j}{Dt} - \hat{N}_{\substack{RLW \\ LLW}}^{n,m} \tag{9}$$

where

$$\hat{N}_{\substack{RUW \\ LUW}}^{n,m} = \sum_{\substack{\text{left wing} \\ +\text{diaphragm}}} \left[\cos 2\psi_w \, W_{\substack{(RW) \\ (LW)}}^{\bar{\nu}\bar{\mu}\bar{\lambda}} - \sin 2\psi_w \, V_{\substack{(RW) \\ (LW)}}^{\bar{\nu}\bar{\mu}\bar{\lambda}} \right] N_{RUW}^{\nu,\mu} * SYM \tag{10}$$

and

$$\hat{N}_{\substack{RLW \\ LLW}}^{n,m} = -\sum_{\substack{\text{left wing} \\ +\text{diaphragm}}} \left[\cos 2\psi_w \, W_{\bar{\nu}\bar{\mu}\bar{\lambda}} - \sin 2\psi_w \, V_{\bar{\nu}\bar{\mu}\bar{\lambda}} \right] N_{RLW}^{\nu,\mu} * SYM \tag{11}$$

and SYM = $\begin{cases} +1.0, \text{ symmetric} \\ -1.0, \text{ antisymmetric} \end{cases}$

(2) For leading edge or tip diaphragm boxes:

$$(N_{RUS} - N_{RLS})^{n,m} = \frac{1}{C_{\bar{\nu}\bar{\mu}0}} \left[-\sum_{\substack{\text{right wing} \\ +\text{diaphragm}}} C_{\bar{\nu}\bar{\mu}0} (N_{RUW} - N_{RLW})^{\nu,\mu} + SYM * \sum_{\substack{\text{left wing} \\ +\text{diaphragm}}} C_{\bar{\nu}\bar{\mu}\bar{\lambda}} (N_{RUW}^{\nu,\mu} - N_{RLW}^{\nu,\mu}) \right] \tag{12}$$

(3) For wake diaphragm boxes:

$$(N_{RUS}-N_{RLS})^{n,m} = \frac{1}{C_{000}}\left[\Delta\bar{\bar{\phi}}_j^{n,m} - \sum_{\substack{\text{rt wing}\\ +\text{diaphragm}}} C_{\bar{\nu}\bar{\mu}\bar{\lambda}}(N_{RUW}-N_{RLW})^{\nu\mu}\right.$$

$$\left. + SYM * \sum_{\substack{\text{left wing}\\ +\text{diaphragm}}} C_{\nu\mu\lambda}(N_{RUW}^{\nu\mu}-N_{RLW}^{\nu\mu})\right] \qquad (13)$$

where

$$\Delta\bar{\bar{\phi}}_j^{n,m} = \Delta\phi_{TE}^{m}\, e^{-ik_1\left(\frac{x_n - x_{TEm}}{b_1}\right)} \qquad (14)$$

$$\left(N_{RUS}^{n,m}+N_{RLS}^{n,m}\right) = -\left(\hat{N}_{\substack{RUS\\RLS}}^{n,m} + \hat{N}_{\substack{RLS\\LLS}}^{n,m}\right) \qquad (15)$$

(4) For the tail:

$$\left(N_{RUT}-N_{RLT}\right)^{n,m} = 2\left(\frac{D\bar{f}^{n,m}}{Dt}\right) + \left(\hat{N}_{\substack{RLT\\LLT}}^{n,m} - \hat{N}_{\substack{RUT\\LUT}}^{n,m}\right)$$

$$- 2\hat{N}_{\substack{RUT\\RW}}^{n,m} - 2\hat{N}_{\substack{RUT\\LW}}^{n,m} \qquad (16)$$

where $\hat{N}_{\substack{RUT\\LUT}}$ and $\hat{N}_{\substack{RLT\\LLT}}$ are computed as in Equation (11) and (12).

$$\hat{N}_{\substack{RUT\\RW}} \sum_{\substack{\text{rt wing}+\\ \text{diaph.}}} \left[\cos(\psi_T-\psi_W)\, W_{\bar{\nu}\bar{\mu}\bar{\lambda}}^{\binom{RT}{RW}} - \sin(\psi_T-\psi_W)\, V_{\bar{\nu}\bar{\mu}\bar{\lambda}}\right] N_{RW}^{\nu\mu} \qquad (17)$$

$$\hat{N}_{\substack{RUT\\LW}} = SYM \sum_{\substack{\text{left wing}+\\ \text{diaph.}}} \left[\cos(\psi_T+\psi_W)\, W_{\bar{\nu}\bar{\mu}\bar{\lambda}}^{\binom{RT}{LW}} - \sin(\psi_T+\psi_W)\, V_{\bar{\nu}\bar{\mu}\bar{\lambda}}\right] N_{LW}^{\nu\mu} \qquad (18)$$

(5) Velocity potentials:

$$\Delta\bar{\bar{\phi}}_j^{n,m} = \sum_{\substack{\text{right surface} \\ \text{and diaphragm}}} C_{\bar{\nu}\bar{\mu}0}\left(N_{RUS}^{\nu\mu} - N_{RLS}^{\nu\mu}\right) + \sum_{\substack{\text{left surface} \\ \text{and diaphragm}}} C_{\bar{\nu}\bar{\mu}1}\left(N_{RUS}^{\nu\mu} - N_{RLS}^{\nu\mu}\right) + SYM \qquad (19)$$

Because the equations involve summations over unknown values, the order of calculation is very critical. The routine computes normal washes and velocity potentials in parallel, one row at a time, inboard-most box first. If the subdivision option is on, each subdivided box must have a set of normal washes computed as well, using equations similar to those above.

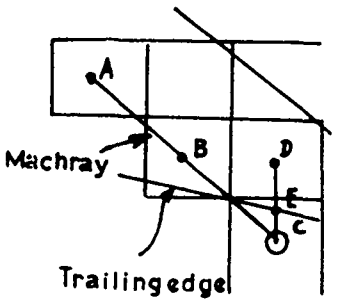
For each box, the $\hat{N}$ terms are first zeroed out. If spatial contribution is present, subroutine GETAIC is called to get the necessary AIC arrays from scratch file IAICSC, and the proper summation is computed over the forward Mach hyperbola. This is first done for $\hat{N}_{\substack{RUS \\ LUS}}$ and $\hat{N}_{\substack{RLS \\ LLS}}$ and stored in variables ENRULU, ENRLLL.

If the surface is a tail, a similar procedure of getting AIC arrays and computing the proper summation for $\hat{N}_{\substack{RUT \\ RW}}$ and $\hat{N}_{\substack{RUT \\ LW}}$ is followed. The results are stored in ENRURW and ENRULW.

If the box being considered is a planform box, the normal wash values are next computed from Equations (9) or (16).

Function B is called to compute the planar $\Delta\bar{\bar{\phi}}$ contribution, except for the contribution of the box to itself. This is stored in variable DELPH. If the box is on planform, the out-of-plane contribution is added, yielding Equation (19). If the box is on a diaphragm, DELPH is used in Equation (12) or (13) to eventually yield the normal wash values at the diaphragm box center.

Trailing edge velocity potentials, array TVP, are computed whenever a trailing edge box is encountered. The computation is normally linear extrapolation from the last two box center values. In the event there is only one box on the tip chord, a Mach ray extrapolation is first done, followed by chord-wise linear interpolation. See Figure 11.



Values at A and B are extrapolated to C. Then the values at C and D are interpolated to give a value at E, the desired trailing edge value.

FIGURE 11 Tip Chord Trailing Edge Velocity Potential Calculation

The subdivision option causes the following:

(1) All row and column loops are on subdivided boxes.

(2) Any necessary $\hat{N}$ terms are calculated once per control point, and stored in temporary arrays for use on all subdivided boxes within the unsubdivided box. $\hat{N}$ terms and spatial contribution of left surface to $\Delta\bar{\bar{\phi}}$ are not calculated using subdivided values.

(3) Function B and $\Delta\bar{\bar{\phi}}$ are not computed for on-planform subdivided boxes which do not contain a control point.

(4) Function B, when called, applies two equations - one within the "effective area" of subdivision, and the other outside this area. It is within function B that the subdivision refinement actually takes place.

(5) Any unsubdivided box which has one or more off-planform subdivided boxes has its normal wash values computed as the average of all subdivided values within its bounds, i.e.

$$N_{RUS}^{n,m} = \left(\sum_{\substack{\text{all subdivided} \\ \text{boxes on box } n,m}} N_{RUS}^{s} \right) / NSUBDV \qquad (\ldots)$$

USAGE: The subroutine is called by:

```
CALL  VELPOT(IBOX,LBXCD,PKERNL,SKERNL,WING,DIHS)
```

Input Parameters:

IBOX	Array of box codes for the surface.
LBXCD	Length of the box code array.
PKERNL	Primary (unsubdivided) $C_{\bar{\nu}\bar{\mu}0}$ array.
SKERNL	Subdivided $C^{K_1/N_s}_{\bar{\nu}\bar{\mu}0}$ array.
WING	.TRUE., the surface is a wing. .FALSE., the surface is a tail.
DIHS	.TRUE., any surface dihedral is to be accounted for. .FALSE., any surface dihedral may be ignored.

Input Common Variables:

Global common blocks used:

/GEOMTY/
/GEOM2/
/MODES/
/FILES/
/CHECKPR/
Blank Common for C

Local common values:

/MUAICS/	YBAR	Parallel offset
	EL	Normal offset
	MUAIC(2,50)	AIC pointer array determined in the geometry section.
	NROWS	Number of rows defined for the AIC set.
/AICS/	XKVL	Current value of K_1
	C	C
	W	W
	V	V
/DELTAP/	{TEXLOC FEXLOC}	{leading trailing} edge X-locations at chord centers
	IPNTRM	Pointer array for modes and velocity potentials.
	DEFSL	Mode shape array - equivalenced to velocity potential array.
	IOVLAP	Measure of tail overlap of wing, box mode shapes.
/NWASHES/	IPNTDW	Pointer array for normal wash values.
/BXCDES/	IBOXW	Wing box codes

Output Common Variables:

/DELTAP/	DELPHI	$\Delta \bar{\bar{\phi}}$ array
	TVP	$\Delta \bar{\bar{\phi}}_{TE}$ array
/NWASHES/	ENRUS	N_{RUW} or N_{RUT}
	ENRLS	N_{RLW} or N_{RLT}
	IOVLAPN	Measure of tail overlap of wing diaphragm, for normal washes.
/SNWASH/	IPNTSD	Pointer array for subdivided normal washes
	ENSUBD	$N_{RUS}^{(S)}$ and $N_{RLS}^{(S)}$
	IPNTIN, IPNTOT, IPNTLS	End-around pointers for array IPNTSD

Fortran Function B

AUTHOR: G. D. Kramer

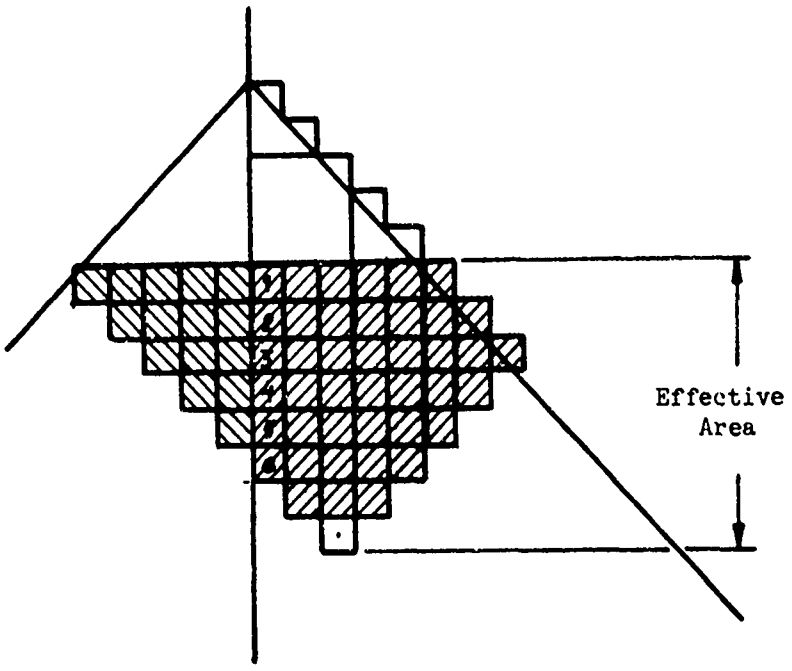
PURPOSE: Given the location of a Mach box, to compute the planar contribution of the rest of the surface to the velocity potential difference for the box.

METHOD: The routine has two sections, one for computing the subdivided contribution within the "effective area," and the other to compute the unsubdivided contribution from ahead of the "effective area". If the subdivision option is off, the second section is used for the full contribution.

In the first section, the summation performed is

$$B_S = \sum_{\bar{\nu}} \sum_{\bar{\mu}} C_{\bar{\nu}\bar{\mu}0}^{K_1/N_S} \left(N_{RUS}^{(S)} - N_{RLS}^{(S)} \right) \qquad (21)$$

where the summation limits are as shown in Figure 12.



Always contributes to the summation
Contributes if the dihedral angle $\Gamma = 0$

FIGURE 12 Subdivided "Effective Area"

The second section starts up where the first leaves off, and computes the second summation in Equation (22)

$$B = B_S + \sum_{\bar{\nu}} \sum_{\bar{\mu}} C_{\bar{\nu}\bar{\mu}o} \left(N_{RUS} - N_{RLS} \right) \qquad (22)$$

where the summation limits are as shown in Figure 13 and the AIC array and normal wash values are now unsubdivided, computed at control points.

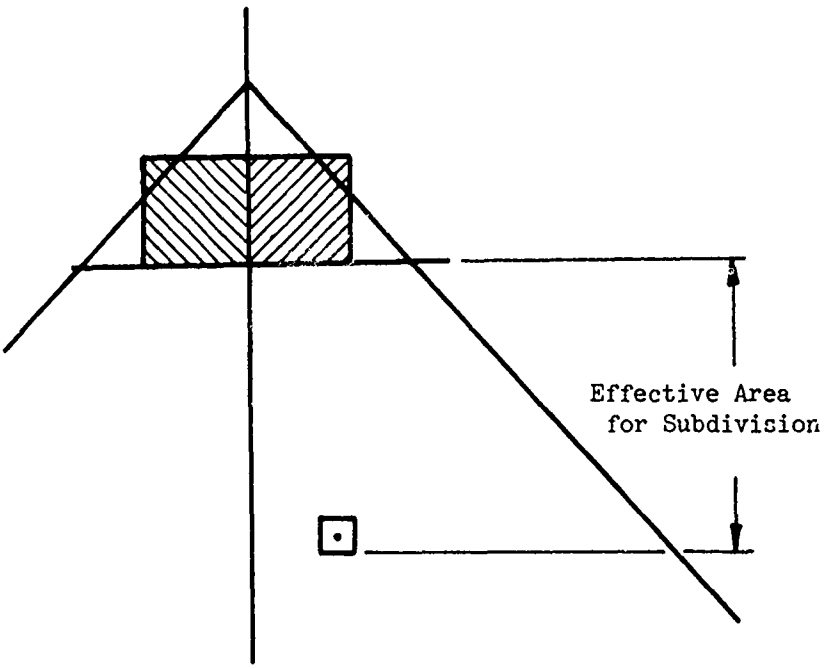


FIGURE 13. Unsubdivided Boxes Outside the "Effective Area"

USAGE: The function is called by:

DELPH = B(IROW,JCOL,PKERNL,SKERNL,IBOX,LBXCD,WING,DIH)

Input Parameters:

IROW, JCOL	Location of receiving point, subdivided
PKERNL	Primary (unsubdivided) $C_{\bar{\nu}\bar{\mu}0}$ array
SKERNL	Subdivided $C_{\bar{\nu}\bar{\mu}0}^{K_t/N_t}$ array
IBOX	Box code array
LBXCD	Length of box/code array
WING	.TRUE., the surface is the wing
	.FALSE., the surface is the tail
DIH	.TRUE., leftside is to be ignored
	.FALSE., Include left side.

Input Common Parameters:

See subroutine VELPOT. Both subdivided and unsubdivided values are used.

Output:

The function value, B, in this case stored in DELPH, is the result of the summations described under METHOD.

Fortran Subroutine SMPLW

AUTHOR: G. D. Kramer

PURPOSE: To compute and print upwashes, sidewashes, and longitudinal washes at arbitrary chord locations in the wake of a wing.

METHOD: This routine is called once for each sampling chord. For each box on the chord, the right wing contribution is summed as

$$WSUM = \sum_{rt.\,wing} W_{\bar{\nu}\bar{\mu}\bar{\lambda}} * N_{RW}^{\nu\mu} \tag{23}$$

$$VSUM = \sum_{rt\ wing} V_{\bar{\nu}\bar{\mu}\bar{\lambda}} * N_{RW}^{\nu\mu} \tag{24}$$

$$PHISUM = \sum_{rt\ wing} C_{\bar{\nu}\bar{\mu}\bar{\lambda}} * N_{RW}^{\nu\mu} \tag{25}$$

where $N_{RW} = \begin{cases} N_{RUW} & \text{if the chord is above the wing,} \\ N_{RLW} & \text{if the chord is below the wing.} \end{cases}$

These sums are then combined as:

$$UW_R = \frac{u}{U} = \left(1/b_1\right) * \left(\cos\Psi_w * WSUM + \sin\Psi_w\ VSUM\right) \tag{26}$$

$$SW_R = \frac{v}{U} = \left(1/b_1\right) * \left(\cos\Psi_w * VSUM - \sin\Psi_w\ WSUM\right) \tag{27}$$

$$PHI_R = PHISUM$$

The left wing contributing summations are identical to Equations (23), (24), and (25), with N_{RW} replaced by N_{LW}.

The results are then combined by

$$UW_{complete} = UW_R + \left(1/b_1\right) * \left(\cos\Psi_w * WSUM - \sin\Psi_w * VSUM\right) * SYM \tag{28}$$

$$SW_{complete} = SW_R + \left(1/b_1\right) * \left(\cos\Psi_w * VSUM - \sin\Psi_w * WSUM\right) * SYM \tag{29}$$

$$PHI_{complete} = PHI_R + PHISUM * SYM \qquad (30)$$

The printed upwash and sidewash is given by Equations (28) and (29). For longitudinal wash, the PHI values computed in Equation (30) are used in

$$LW(I) = \frac{1}{2 b_{1/3}} \left[PHI(I+1) - PHI(I-1) \right] \qquad (31)$$

USAGE: The rcutine is called by:

```
CALL  SMPLW(IBOX,LBXCD,JCHRD,JT,IFRST,ILAST)
```

Input Parameters:

IBOX	Array of wing box codes
LBXCD	Length of box code array
JCHRD	Sample wash chord number, with reference to the order specified in the card data
JT	The y-location of the chord
IFRST	Number of the first sample box desired
ILAST	Number of the last sample box desired

9. VELOCITY POTENTIAL SMOOTHING SECTIONS

FORTRAN Program SMTH

Author: G. E. Keylon

Purpose: To smooth the velocity potentials by using a least squares surface fitting technique.

Method: The velocity potentials are read in from a disk file and smoothed with a least squares fit by subroutine FITTER, previously described. The polynomial equation derived from the fit is then used to compute an array of velocity potentials at planform box centers.

Usage: The SMTH program is the main program of a secondary overlay of the Mach box program. It is called as follows:

```
CALL OVERLAY (6HAFMBØX, 1, 6, 0)
```

Input:

USES LABELLED COMMON BLOCKS

/ARRAYS/
/FILES/
/IOCONT/
/PROBLM/
/KVAL/
/GEOMTY/
/GEOM2/
/TAPEIO/
/RWBUFF/

Uses the following files
MODESC, IGEOSC, IVPSC

Output:

Output is stored on file IWTFSC which is changed to IVPSC.

FORTRAN Program CRDFIT

Author: G. E. Keylon

Purpose: To smooth the velocity potentials by using a least squares curve fit along each chord.

Method: The velocity potentials are read in from a disk file. The values for each chord are then separated into an array. The values are then changed to the numerical slope between the midpoint average values. Subroutine CURVE is then called to fit a least squares polynomial curve though these slopes. The polynomial equation is then integrated at each box on the chord and the integral value becomes the velocity potential at that box.

Usage: The CRDFIT program is the main program of a secondary overlay of the Mach box program. It is called as follows:

```
CALL OVERLAY (6HAFMBOX, 1, 7, 0)
```

Input:

USES LABELED COMMON BLOCKS

```
/ARRAYS/
/FILES /
/IOCONT/
/PROBLM/
/KVAL  /
/GEOMTY/
/GEOM2 /
/TAPEIO/
/RWBUFF/
```

Uses the following files

MODESC, IGEOSC, IVPSC

Output:

Output is stored on file IWTFSC which is changed to IVPSC.

FORTRAN Subprogram CURVE

Author: G. E. Keylon

Purpose: To fit a curve in the least squares sense through a set of data points.

Method: The CURVE routine is passed a set of ordered complex pairs and the degree of polynomial to fit. The system of simultaneous linear equations is solved employing the Choleski square root method (see Ref. 1). If the polynomial degree exceeds the limits possible to fit the degree is reduced to a lower level.

Usage: CALL CURVE (M,N,X,Z,C)

Input:

M - degree of polynomial equation
N - number of data points to fit curve through
X - Array of X coordinates (independent variable)
Z - Array of Z coordinates (dependent variable, complex)

Output:

C - output polynomial coefficient array, complex

10. GENERALIZED AIR FORCES SECTION

Fortran Program FORCES

AUTHOR: G. E. Keylon, G. D. Kramer

PURPOSE: To calculate the boxlifts, section lifts, and generalized air forces for a problem.

METHOD: Planform information is first read from the geometry and modes scratch files. The outer-most loop on thickness slope functions is then entered. One set of thickness slope functions, defined at box centers by Equation (1), is read in from scratch file ITSLSC. Next a loop on mode shapes, used as weighting functions for the generalized forces calculations, is entered. One mode shape is read from scratch file MODESC.

The third loop entered is on velocity potentials. The $\bar{\bar{\Delta\phi}}$ array is read into DELPHI and $\bar{\bar{\Delta\phi}}_{TE}$ into array TVP from scratch file IVPSC. The box pattern for each surface is then passed over, one row at a time. For each box the following values are computed:

$$\bar{\bar{L}}_j^{nm} = \text{BXLIFT(IDC)} = \frac{2}{\beta}\left[\Delta\bar{\bar{\phi}}_{j\,TE}^{nm} - \Delta\bar{\bar{\phi}}_{j\,LE}^{nm} + i\alpha^{nm} k_1 \Delta\bar{\bar{\phi}}_j^{nm}\right]\bar{\bar{Z}}_\tau^{nm} \tag{32}$$

$$\Delta C_{p_j}^{nm} = \text{DELCP(IDC)} = \bar{\bar{L}}_j^{nm} / (\alpha^{nm} * b_1) \tag{33}$$

$$\bar{\bar{Q}}_{ij}^{nm}\,\beta/2 = \left[\left(f_{TE}^{nm} * \Delta\bar{\bar{\phi}}_{TE}^{nm} - f_{LE}^{nm} * \Delta\bar{\bar{\phi}}_{LE}^{nm}\right) - b_1\alpha^{nm}\frac{\partial f^{nm}}{\partial x}\Delta\bar{\bar{\phi}}^{nm} + i\alpha^{nm} k_1 f^{nm}\Delta\bar{\bar{\phi}}_j^{nm}\right]\bar{\bar{Z}}_\tau^{nm} \tag{34}$$

The $\bar{\bar{Q}}_{ij}^{nm}\beta/2$ terms are summed as calculated, and stored as

$$\text{AFROW(JVP)} = \sum_m \sum_n Q_{ij}^{nm}\,\beta/2 \tag{35}$$

After all boxes have been processed, if boxlifts and section lifts are desired and this is the first mode shape, box lifts are printed, section lifts are computed and printed, and total lift is printed:

$$\bar{\bar{L}}_j^{m} = \text{SLIFT(JCOL)} = \sum_n \bar{\bar{L}}_j^{nm} \tag{36}$$

$$\bar{L}_j = \text{TLIFT} = \sum_m \bar{\bar{L}}_j^{m} \tag{37}$$

After this has been done for all velocity potentials, one row of the final generalized air forces arrays is computed as:

$$\bar{\bar{Q}}_{ij} = \text{GENAF(IJ)} = 2/\beta \quad \text{AFROW(JVP)} \tag{38}$$

$$Q'_{ij} = -b_1/s^3\beta \; Re\left[\bar{\bar{Q}}_{ij}\right] \tag{39}$$

$$Q''_{ij} = -b_1^2/(k_1 s^4\beta) \; Im\left[\bar{\bar{Q}}_{ij}\right] \tag{40}$$

The program does the above for all mode shapes, prints the results, optionally writes them on tape, then terminates. Printing is done in routines PRNTBL, PRNTSL, and PRNTAF.

For Equations (32) and (34) box leading and trailing edge values are needed. Several geometric conditions exist:

(1) Box leading or trailing edge is internal to the planform: Linear interpolation is used,

$$f_{LE}^{nm} = \frac{1}{2}\left(f^{n-1,m} + f^{n,m}\right) \tag{41}$$

$$\Delta\bar{\bar{\phi}}_{LE}^{nm} = \frac{1}{2}\left(\Delta\bar{\bar{\phi}}^{n-1,m} + \Delta\phi^{nm}\right) \tag{42}$$

and similarly for the box trailing edge.

(2) Box is cut by the planform leading edge:

$$f_{LE}^{nm} = f^{nm} - \left(X_n - X_{LE}\right) * \frac{\partial f^{nm}}{\partial x} \qquad \text{(point-slope)} \tag{43}$$

$$\Delta\phi_{LE}^{nm} = \begin{cases} 0 & \text{for wing or spatial tail} \\ \Delta\bar{\bar{\phi}}_{\substack{TE\ of \\ wing}} * e^{-i\frac{\left(x_{LE_{tail}}^{m} - X_{TE_{wing}}^{m}\right)k_1}{b_1}} \end{cases} \tag{44}$$

(3) Box is cut by the planform trailing edge

$$f_{TE}^{nm} = f^{nm} + (X_{TE} - X_n) \cdot \frac{\partial f^{nm}}{\partial X} \qquad (45)$$

$\Delta\bar{\bar{\phi}}_{TE}$ Computed planform trailing edge value, TVP, as described under subroutine VELPOT. This normally is a linear extrapolation using the forward adjacent box center and the current one for the two necessary $\Delta\bar{\bar{\phi}}$ values.

USAGE: The FORCES program is the main program of a secondary level overlay of the Mach Box program. It is called as follows:

```
CALL  OVERLAY( 6HAFMBØX, 1, 7, 0)
```

Input:

Uses labeled common blocks:

/ARRAYS/
/FILES/
/IOCONT/
/KERN/
/KVAL/
/PROBLM/
/MODES/
/GEOMTY/
/GEOM2/
/TAPEIO/
/RWBUFF/

Uses the following files:

MODESC
IPNTRM
IVPSC
ITSLSC

Output:

Printer and tape NOUTP (optional).

11. COMMON BLOCK ORGANIZATION

The basic geometric and program control parameters are stored in a set of labeled common blocks which are loaded with the primary level overlay and thus are available to any secondary overlay. Some of the variables come directly from card input values (see Part I, Section III of this report), and others are internally computed.

		Default
/CONTRL/ PREVEX, OMACH, TITLE(8), PRVGEOM, PRVMODE, DIHW, DIHT, DEFAULT		
PREVEX	Tested for code word in the data preprocessor link to determine whether defaults should be set or prior status maintained (recycle)	--
OMACH	Mach # from previous cycle, compared on recycle to determine whether planform geometry needs changing.	0.
TITLE(8)	One-line title for all printed headings	blank
PRVGEOM	.T. previous geometry is to be used this cycle	.F.
	.F. New geometry is to be read	
PRVMODE	.T. previous modes are to be used this cycle	.F.
	.F. new modes are to be read	
DIHW} DIHT}	.T. {Wing Tail} dihedral is to be used computing influence on itself	.F.
	.F. The {wing tail} is to be considered flat in computing influence on itself, but dihedral will be used in wing/tail calculations	
DEFAULT	.T. All parameters on Card C are to be set to their default values	.F.
	.F. Do not set parameters to default.	

/PROBLM/ XMACH, NMODES, NTSLOP, NKVALS, SMOOTH, NDEG, CRDFIT, EXAIC, SUBDV, PLYWOOD		
XMACH =	Mach number for current cycle	no default
NMODES =	Number of input modes to use	no default
NTSLOP =	Number of thickness slope functions to be used	0
NKVALS =	Number of reduced frequencies to be used	0
SMOOTH =	.T., Velocity potentials surface smoothing desired	
	.F., No velocity potential surface smoothing desired	.F.
NDEG =	Maximum order for smoothing polynomial	0, program will determine
CRDFIT =	.T., Chordwise velocity potential smoothing desired	
	.F., No chordwise smoothing desired	.F.
EXAIC =	.T., Integration accuracy of 10^{-4} desired	
	.F., Integration accuracy of 10^{-2} desired	.F.
SUBDV =	.T., Subdivision is to be applied	
	.F., No subdivision is desired	.F.
PLYWOOD =	.T., Full box areas to be used in box lifts	
	.F., Planform box areas to be used.	

Default

/GEOMTY/ COPLAN, NSUBDV, XSUBDV, NSUBD2, NSUBCN, NSURF,
B1, B1BETA, B1S, B1BTAS, WLAX, WLAZ, PSIW, MXBW, MXBBW,
MYBW, MYBBW, MXBSW, MYBSW, MYBBSW, IXBW, XCENTR

/GEOM2/ TLAX, TLAZ, PSIT, MXBT, MYBT, MYBBT, MXBST,
MYBST, MYBBST, IXBT, IXBST, CAPL

COPLAN	.T. PSIW = PSIT and CAPL = 0. One box array is used .F. The 2 surfaces are not coplanar, or only one surface is defined	--
NSUBDV	Number of subdivided rows (columns) per box	1
XSUBDV	= Float (NSUBDV)	1.0
NSUBD2	= NSUBDV/2	0
NSUBCN	= NSUBD2 + 1 = center location of first chord	1
NSURF	Number of surfaces, 1 or 2	1
B1	Box length = B1BETA * $\sqrt{M^2 - 1}$	--
B1BETA	b_1/β, box width, = YWLE(NWLE)/MYBW	--
B1S B1BTAS	Subdivided box {length = B1/XSUBDV width = B1BETA/XSUBDV}	-- --
WLAX TLAX	{Wing Tail} local axis location, in global X coordinate	0. 0.
WLAZ TLAZ	{Wing Tail} local axis location, in global Z coordinate	0. 0.
PSIW PSIT	{Wing Tail} dihedral angle, input in degrees but immediately changed to radians.	0. 0.
MXBW MXBT	Number of rows to aftmost portion of the {wing tail} measured in the n_c coordinate	-- --
MXBBW	Number of rows to aftmost wing diaphragm box, n_c coordinate	--
MYBW MYBT	Number of chords on the {wing tail}, m_c coordinate	{=NCHRDS --}
MYBBW MYBBT	Number of {wing tail} chords, including tip diaphragm	-- --
MXBSW MXBST	Subdivided MXB {W T} count	-- --

		Default
MYBSW MYBST	Subdivided MYB {W, T} count	-- --
MYBBSW MYBBST	Subdivided MYBB {W, T} count	-- --
IXBW IXBT	Subdivided grid X-location of the first unsubdivided {wing, tail} box center	-- --
IXBST	Subdivided grid X-location of the first subdivided tail box	--
XCENTR	X_w location of the center of the first box on the wing	No default
CAPL	Non-dimensionalized vertical distance between centerlines of the wing and tail	0.

/KERN/ ERR, MXSKRN, IPKERN, NPLKRN, NSPATK, NRØWEA

ERR	Integration accuracy in AIC calculations	.01
MXSKRN	Size of the subdivided AIC, array (number of rows)	
IPKERN	Location in array SKERNL where PKERNL(1) would be if it were not overlaid by the subdivided $C_{\bar{v}\bar{p}o}$ array.	]
NPLKRN	Size of the planar AIC array (number of rows)	--
NSPATK	Number of spatial AIC arrays necessary	0
NRØWEA	Number of rows for the subdivided effective area	--

/KVAL/ IKVAL, XKVAL(20), XKS (20)

IKVAL	Current k-value number being solved	
XKVAL	Array of reduced frequencies, k_1, based on box length, b_1	
XKS	Array of reduced frequencies, k_s, based on semispan, s.	

/FILES/ NT5, NT6, INTAPE, INFSP, NPLAIC, NSPAIC, NOUTP, IOUFSP, MODESC, IVPSC, IGEOSC, IWTFSC, IAICSC

NT5	Card file (INPUT)	5
NT6	Print file (OUTPUT)	6
INTAPE	Binary input tape number, If 0 or 5 card input will be used	0

		Default
INFSP	Initial file spacing on the input tape	0
NPLAIC NSPAIC	Tape number for the {planar / spatial} AIC arrays	0 0
NOUTP	Binary output tape number. If 0, none written	0
IOUFSP	Initial file spacing on tape NOUTP	0
MODESC, IVPSC IGEOSC, IWTFSC IAICSC	Internal scratch files	

/IOCONT/ OPLAIC, OSPAIC,
WTGEOM, WTGNAF, WTSL, WTBL, PRBOX, PRPAIC,
PRSAIC, PRMODS, PRCOEF, PRUW, PRSW, PRVP, PRBL,
PRDCP, PRGNAF, PRGNAC, PRSL, PRLW, PRNW

OPLAIC OSPAIC	.T., an old {planar / spatial} AIC tape is being used .F., a new {planar / spatial} AIC tape is being used	.T. .F.
WTGEOM	Not used	.F.
WTGNAF	.T., Write generalized air forces on tape	.T.
WTSL	.T., Write section lifts on tape	.F.
WTBL	.T., Write box lifts on tape	.F.
PRBOX	.T., Print the box code pattern(s)	.F.
PRPAIC PRSAIC	.T., Print the {planar / spatial} AIC arrays	.F. .F.
PRMODS	.T., Print modal deflections and slopes	.F.
PRCOEF	.T., Print modal polynomial coefficients, if available	.F.
PRUW PRSW PRLW	.T., for wake wash sampling, print {upwashes / side washes / longitudinal washes}	.F. .F. .F.
PRVP	.T., Print velocity potential differences	.F.
PRBL	.T., Print box lifts, $\bar{\bar{L}}_j^{n,m}$	.F.
PRDCP	.T., Print change in pressure, $\Delta C_{p_j}^{n,m}$	.F.
PRGNAF	.T., Print generalized airforces, $\bar{\bar{Q}}_{ij}$	.T.
PRGNAC	.T., Print generalized aerodynamic coefficients, Q' and Q''	.F.
PRCM	.T. Print sectional generalized airforces, $\bar{\bar{Q}}_{ij}^{m}$	.F.

		Default
PRSL	.T., Print section lifts, $\bar{\bar{L}}^m_j$	.F.
PRNW	.T., Print normal washes, N_{RUW}, N_{RUW}, etc.	.F.

/TAPEIO/ NFS, NMS, LS, NMR, ID(20), NID, ITYPE, LRS, LWS, M, N, PARM(10), IRR
DIMENSION IPARM(10)
EQUIVALENCE (PARM, IPARM)

NFS NMS	{File {Matrix} spacing	0 0
LS NMR	Not used	
ID	ID array for the matrix	
NID	Number of words in the ID array on tape	1
ITYPE	Matrix type - MIXED, COMPLEX	
LRS LWS	Not used	
M N	Matrix dimensions	-- --
PARM	Numerical parameters for the matrix	--
IRR	Error return	-0-

/MODES/ SYM, SYMT, MTYPEW, MTYPET

SYM	1, Symmetric modes -1, Antisymmetric modes 0, Left surface contribution will be ignored	1
SYMT	As above, for a non-planar tail. Differs only for vertical tail	SYM
MTYPEW	1, Polynomial coefficients will be read for the wing 2, Deflections at arbitrary locations will be read 3, Box center values will be read	2
MTYPET	1, Same as above for the tail 2, 3,	2

/ARRAYS/ KBXCDW, LBXCDW, LBOXC, KBXCDT, LBXCDT, KJALPH, LJALPH, KALPHA, KKERNL, LKERNL, KPNTRM, LPNTRM, KDEFSL, KELPHI, LMODES, KPNTSD, LPNTSD, KSDW, LSDW, KPNTDW, LPNTDW, KDW, LDW, KTVP, LTVP

Locations and limits for arrays:

Variable	Array affected	Value
KBXCDW	IBOXW (LBXCDW, LBOXC)	Not used
LBXCDW		150
LBOXC		8
KBXCDT	IBOXT (LBXCDT, LBOXC)	Not used
LBXCDT		90
KJALPH	IJALPH (LJALPH)	Not used
LJALPH		200
KALPHA	ALPHA (LJALPH)	Not used
KKERNL	SKERNL (LKERNL), PKERNL	1
LKERNL		1640
KPNTRM	IPNTRM (2, LPNTRM)	Not used
LPNTRM		100
KDEFSL	DEFSL (2, LMODES)	Not used
KELPHI	DELPHI (LMODES), complex	Not used
LMODES		500
KPNTSD	IPNTSD (2, LPNTSD)	Not used
LPNTSD		50
KSDW	ENSUBD (2, LSDW)	Not used
LSDW		600
KPNTDW	IPNTDW (2, LPNTDW)	Not used
LPNTDW		100
KDW	ENRUS (LDW), ENRLS (LDW)	Not used
LDW		1275
KTVP	TVP (LTVP), TEXLOC (LTVP),	Not used
LTVP	FEXLOC (LTVP)	250

Default

/RWBUFF/ BFCODE, IBFCNT, BUFF (3280)

BFCODE	= Code word	8HBUFFSIZE
IBFCNT	= Size of buffer	3280
BUFF	= Buffer array for use by READMX and WRTEMX	

/SAMPLW/ ISMPLW, ICHORD(10), IBOXF(10), IBOXL(10), ZLOC(10)

ISMPLW	Number of chords specified for wash sampling	0
ICHORD	Chord number for sampling	-
IBOXF	First box on chord to be sampled	-
IBOXL	Last box on chord to be sampled	-
ZLOC	Z-location of sampling chord, transformed internally to correspond to wing coordinates	0.

/PLANXY/ NWLE, NWTE, NTLE, NTTE, XWLE(10), YWLE(10), XWTE(10), YWTE(10), XTLE(10), YTLE(10), XTTE(10), YTTE(10)

NWLE, NWTE — Number of wing {leading edge / trailing edge} definition points

NTLE, NTTE — Number of tail {leading edge / trailing edge} definition points

XWLE, YWLE — Wing leading edge definition points

XWTE, YWTE — Wing trailing edge definition points

XTLE, YTLE — Tail leading edge definition points

XTTE, YTTE — Tail trailing edge definition points

COMMON/ CHECKPR/ DPPCPR, GEOCPR, AICCPR, NWSCPR, SMCPR, GAFCPR

These variables are all typed logical. They control whether or not internal checkout print statements will be executed. They will be read from Card C, default .FALSE.

DPPCPR	Data preprocessor check-print
GEOCPR	Geometry check-print
AICCPR	AIC section check-print
NWSCPR	Normal wash & velocity potential check-print
SMCPR	Velocity potential smoothing check-print
GAFCPR	Generalized Airforces check-print

12. ARRAY STORAGE

In order to conserve storage, a number of arrays are used as pointers for sparse arrays. All unusual array usage is described below.

a. Arrays Generated in the Geometry Section

IBOXW - Subdivided box pattern for first planform, or both if "coplanar"

IBOXT - Subdivided box pattern for 2nd planform, if non-"coplanar"

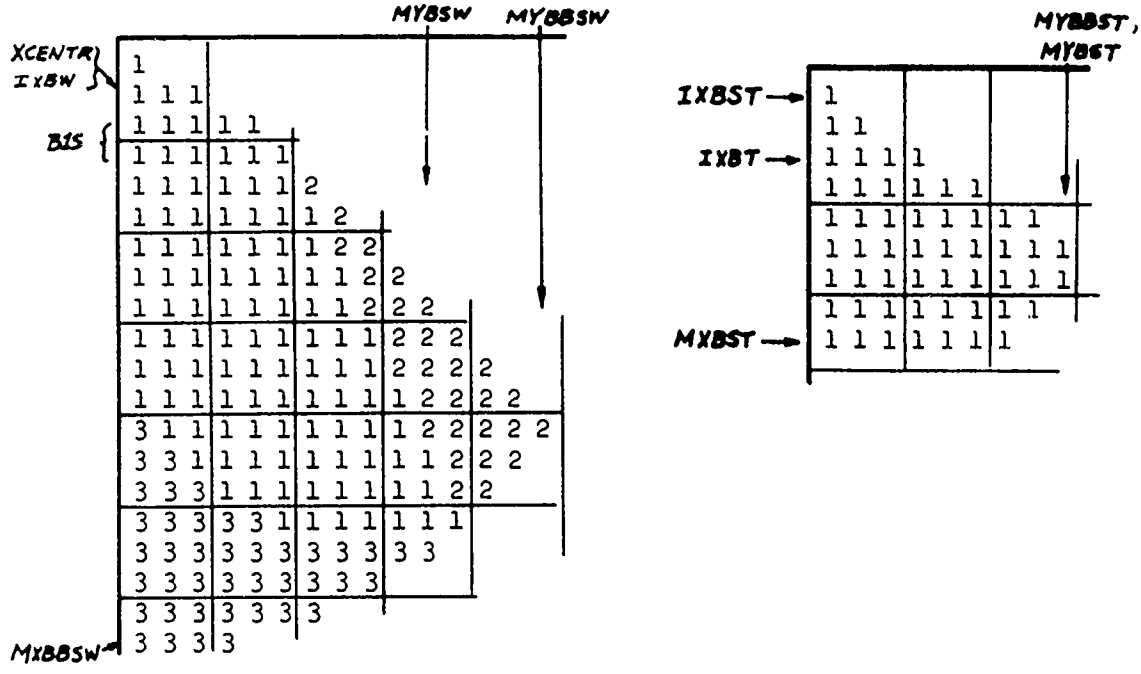
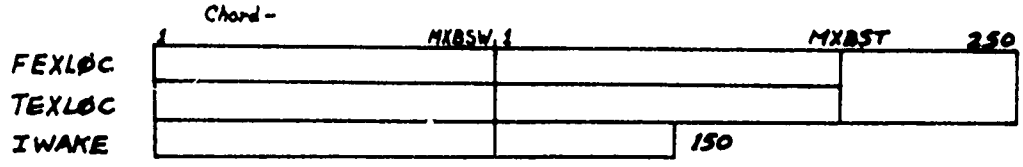


FIGURE 14. Box Code Arrays

The box code arrays are packed twenty numbers to a word, so IBOXW(1,1) contains codes for box (1,1) through box (1,20), IBOXW(2,1) contains codes for box (2,1) through box (2,20), etc.

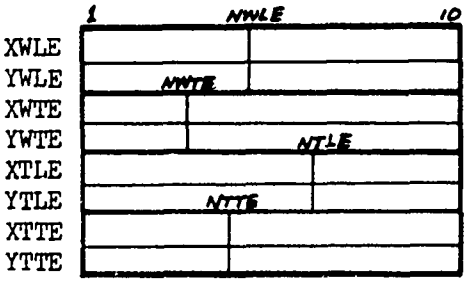


FEXLOC(I) = The location of the leading edge at chord I, normalized to BlS with 1.0 corresponding to the center of the 1st (subdivided) row.

TEXLOC(I) = Same for trailing edge.

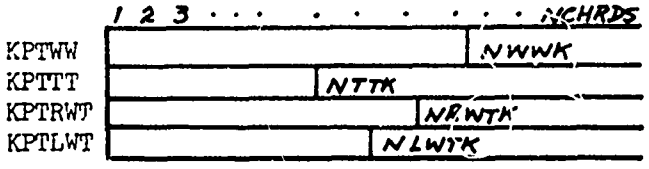
IWAKE(I) = Aftmost subdivided wing wake box needed by the tail.

FIGURE 15. Leading and Trailing Edge Arrays

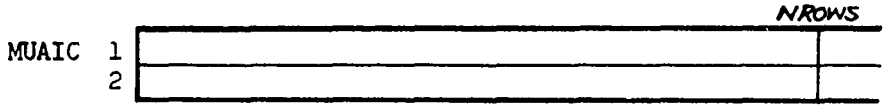


Planform edge definition, Non-dimensionalized and shifted after reading.

FIGURE 16. Planform Edge Definitions



For each AIC array needed:



MUAIC(1,J) = first box needed in row j
MUAIC(2,J) = last box needed in row J

FIGURE 17. AIC Array Pointers

The four KPT-- arrays indicate the location on scratch file IAIC30 of the desired AIC array set. For example, KPTT(3) is the AIC set number (4 matrices per set) of the AIC's for the influence of the left tail on right tail chord 3.

b. Arrays generated in the Modes Section

IPNTRM — Pointer array for planform boxes on a row.

	J = 1	2	3	4		N	N+1		
IPNTRM(1,J)	1	2	5	10		81	89		
IPNTRM(2,J)	1	1	1	1		3	0		

J — Normally the row number for which the pointer value is being computed. If there are 2 surfaces that are noncoplanar, the value of J representing the first row of the second planform is MYBW+IOVLAP. IOVLAP is the number of rows on the tail planform that have same x coordinates as rows on the wing planform. If there are no rows with this condition IOVLAP is zero.

IPNTRM(1,J) — The sequential count + 1 of all boxes, planform or wake region, that are on or between the first and last planform box of all rows forward of the one J represents

IPNTRM(2,J) — The chord number of the first planform box on the row represented by J.

FIGURE 18. Row Pointers

c. Arrays Generated in the AIC Section

The $C_{\bar{\nu}\bar{\mu}\lambda}$, $W_{\bar{\nu}\bar{\mu}\lambda}$ and $V_{\bar{\nu}\bar{\mu}\lambda}$ arrays are stored in a one dimensional matrix. For planar AIC's the $W_{\bar{\nu}\bar{\mu}\lambda}$ and $V_{\bar{\nu}\bar{\mu}\lambda}$ are not computed and the $C_{\bar{\nu}\bar{\mu}\lambda}$ array is calculated for 1/2 of the Mach cone since it will be symmetrical. If subdivision is applied then 2 planar arrays are calculated with the subdivided array overlaying part of the unsubdivided array.

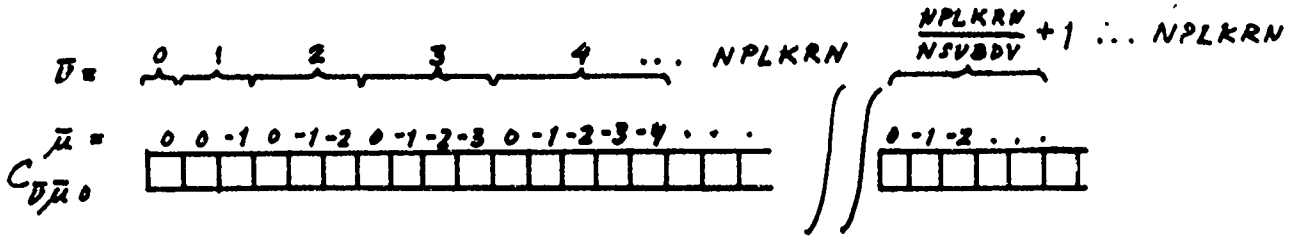


FIGURE 19. Planar AIC

For unsubdivided cases the array ends when $\bar{\nu}$ = NPLKRN. For subdivided cases when $\bar{\nu}$ = NPLKRN the array contains the subdivided AIC calculated at $k_1=k_1/NSUBDV$. $\bar{\nu}$ then is reduced to $\frac{NPLKRN}{NSUBDV}+1$ and is allowed to increase again until it reaches NPLKRN or the number of rows to cover the planform.

Because of the possible condition where the receiving point of a planform may not be in alignment with boxes on other planforms the spatial AIC's must be calculated on both sides.

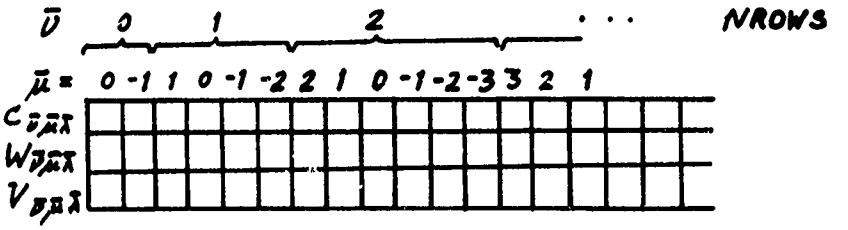


FIGURE 20. Spatial AIC's

13. INTERNAL SCRATCH FILES

a. Matrix Format

All arrays written on disk or tape files are formatted as variable sized matrices. Each matrix consists of two logical records of binary information, the first one being a 16-word matrix identification record, and the second containing the contents of the matrix. The reading/writing of these matrices is done by subroutines READMX and WRTEMX. In the following tape maps, each matrix is a separate box.

Matrix Identification Record - 16_{10} words

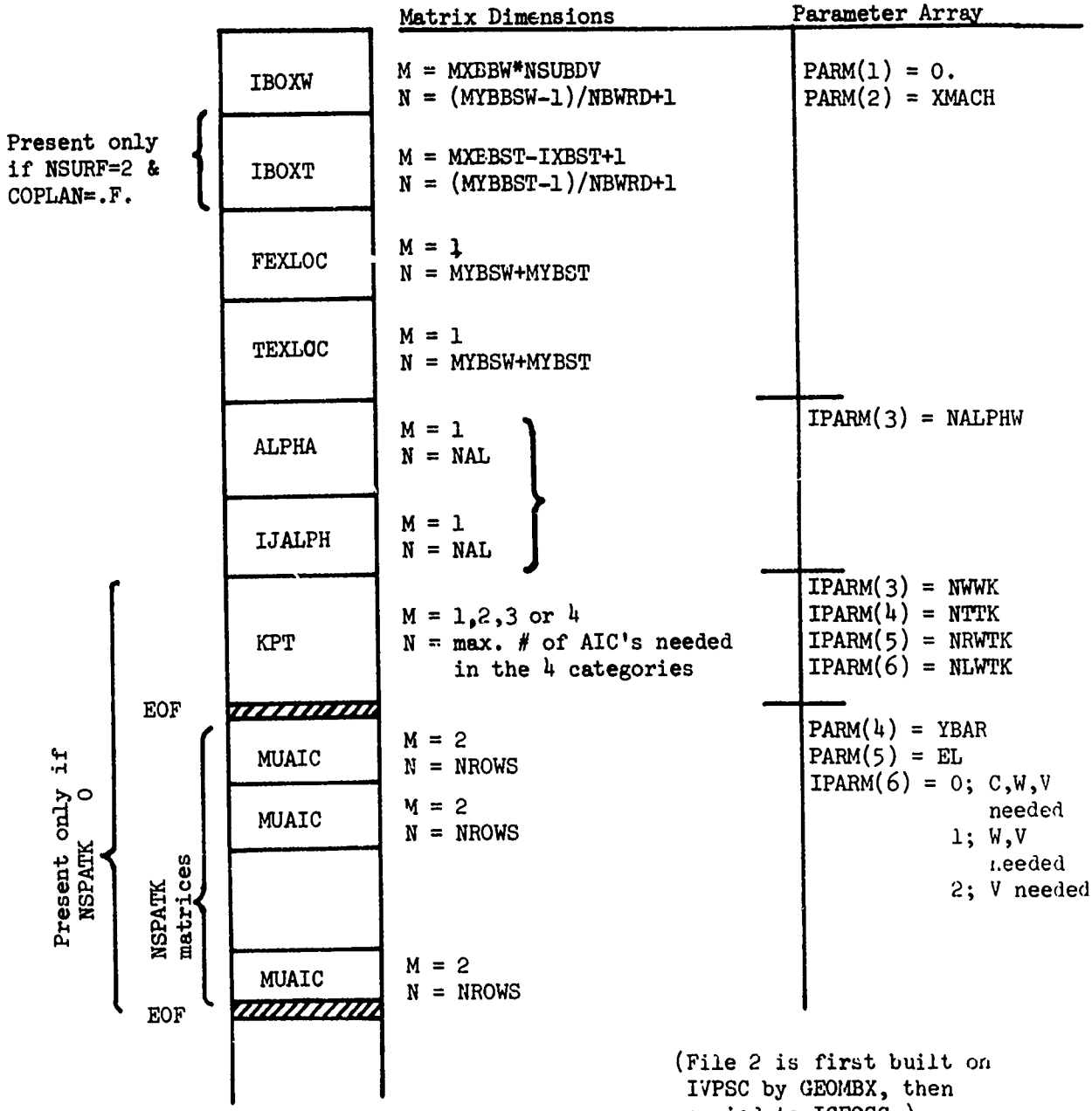
Word	Contents
1	One-word ID label, an integer or label
2	M, the number of rows in the matrix
3	N, the number of columns in the matrix
4	Not used, = 0
5	Not used, = 0
6	Number of words in matrix record
7	K_1
8	Mach Number
9	
10	
11	User parameters, array PARM
to	
16	

Matrix Record - variable length (word 6 above)

Ordered consecutively by row, left to right within each row.

b. Geometry Scratch File IGEOSC

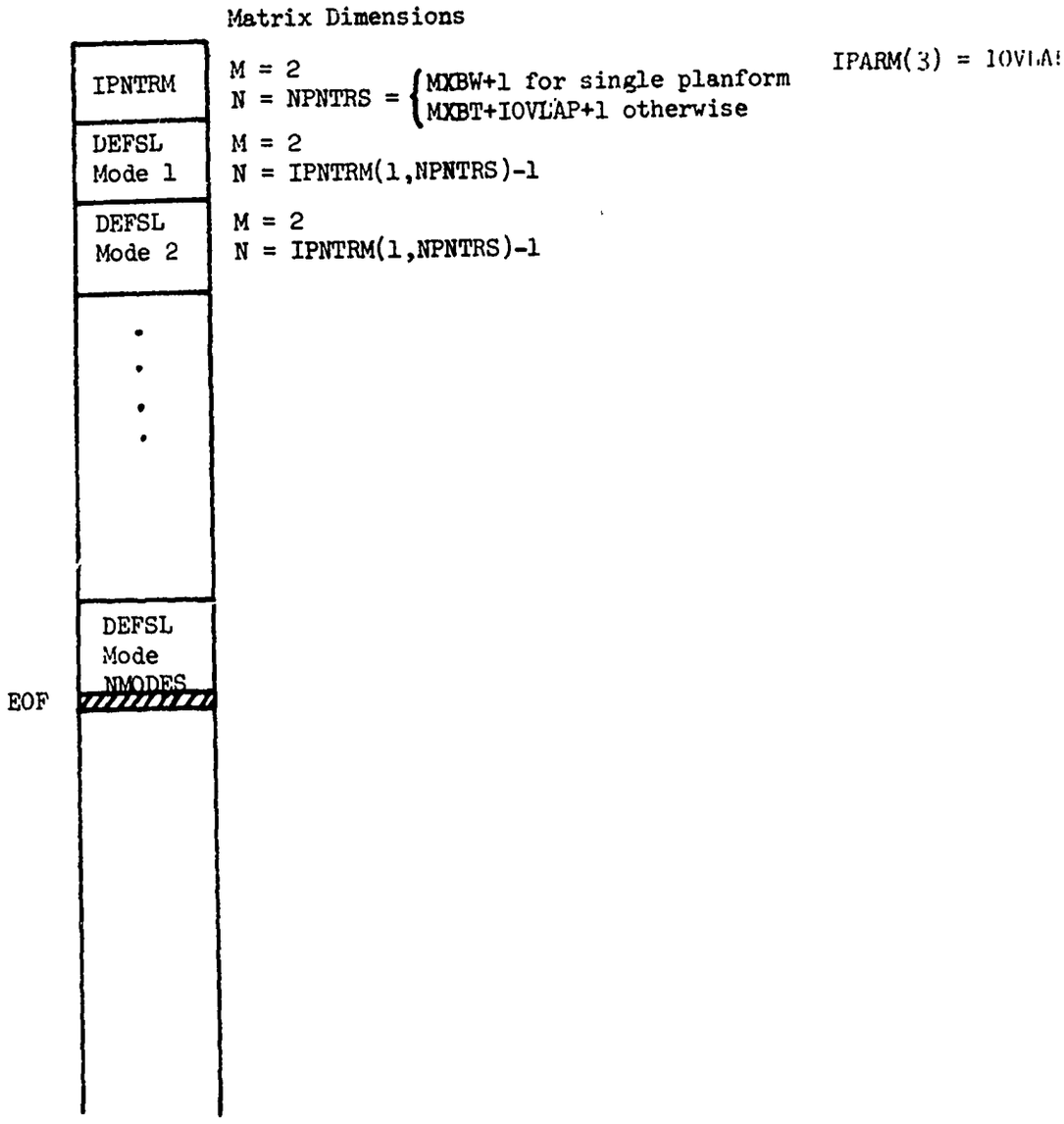
This file is generated in the geometry processor and contains all large geometry arrays. The space after the two geometry files is used for temporary scratch during mode shape processing.



(File 2 is first built on IVPSC by GEOMBX, then copied to IGEOSC.)

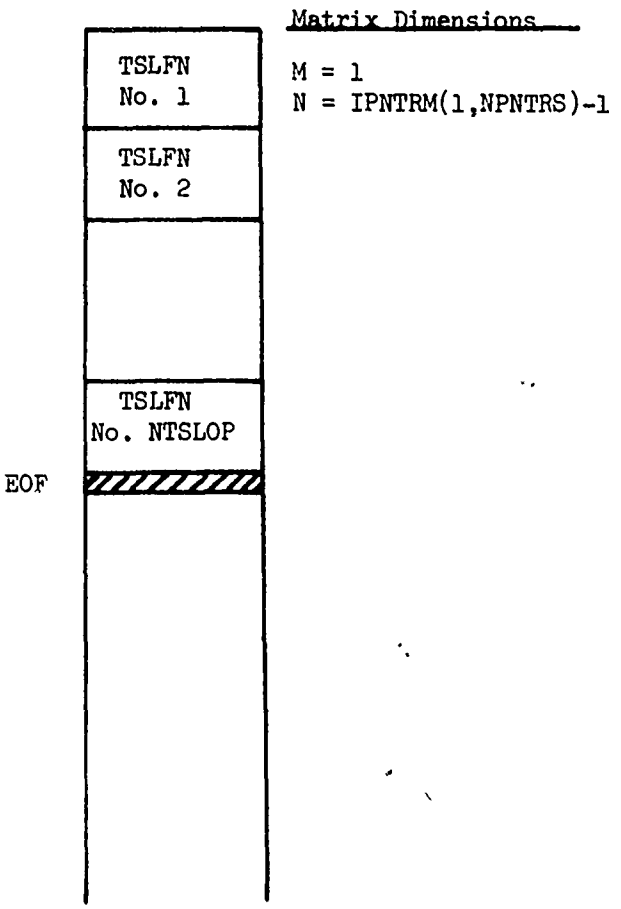
c. Modes Scratch File MODESC

This file is generated in the modal data processor. The deflections and slopes are given at all box centers.



d. Thickness Slopes Scratch File ITSLSC

This file is equivalenced to IWTFSC, which is first used in GEOMBX for temporary scratch while building the MUAIC arrays. The thickness slope functions are then written on the file at the end of the modal data processor. If NTSLOP = 0, one matrix of ones will be written, corresponding to $\frac{\partial z_\tau}{\partial x} = 0$.

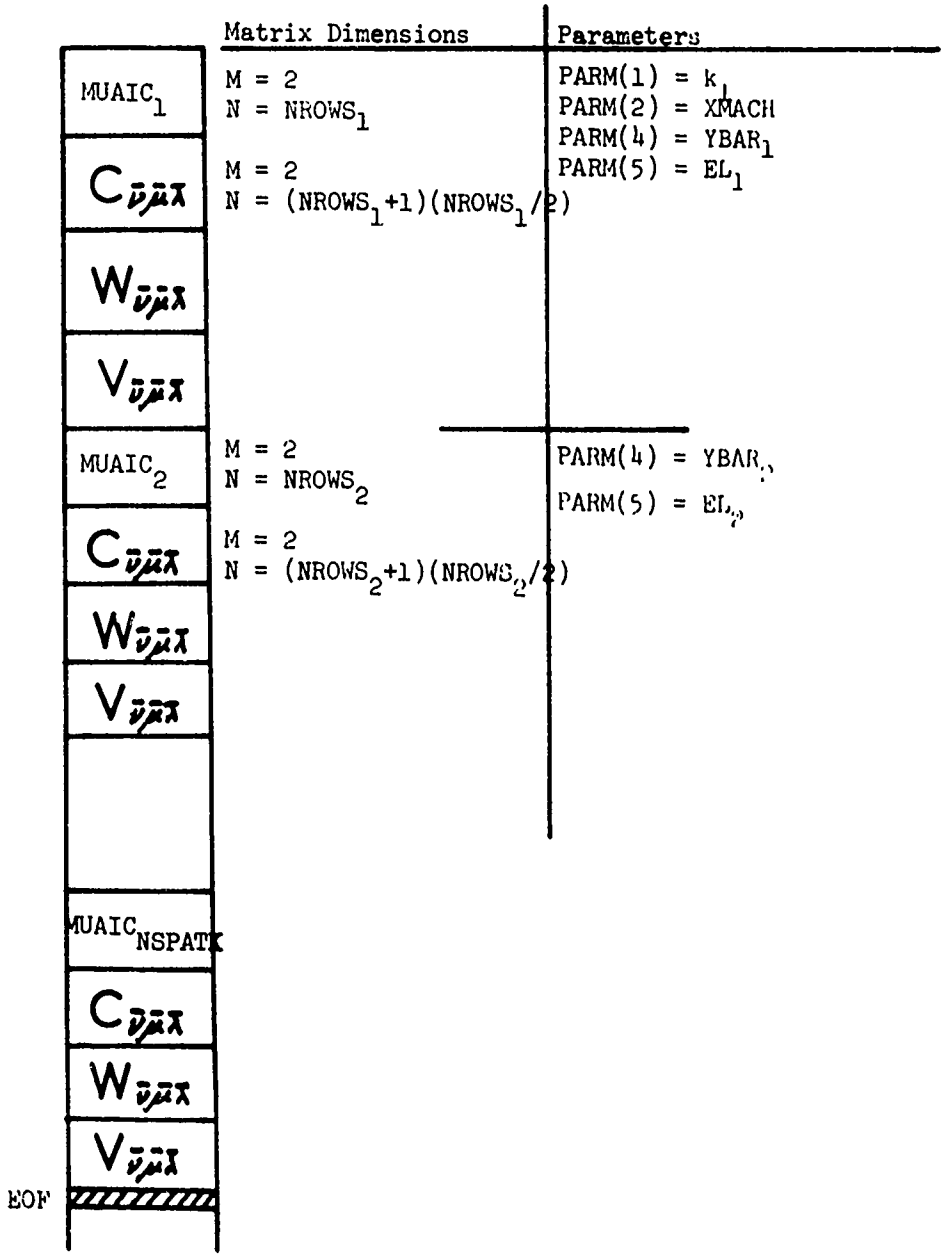


Matrix Dimensions

M = 1
N = IPNTRM(1,NPNTRS)-1

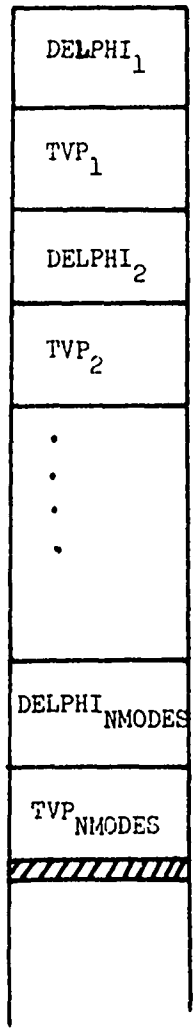
e. Spatial AIC Scratch File IAICSC

This file is first used for internal scratch during calculation of polynomial coefficients by the modal data processor. In the AIC section it is written with all spatial AIC's needed for one reduced frequency, as determined in the geometry section. IAICSC is rewritten for each new reduced frequency.



f. Velocity Potentials Scratch File IVPSC

This file is first used for internal scratch by the geometry processor while assembling MUAIC arrays. It is later used in the modal data processor as temporary storage for the wing mode shapes to be merged with the tail modes, and again for the same purpose when working with thickness slope functions. In the normal wash and velocity potentials section it is written with the $\Delta\phi$ and $\Delta\phi_{TE}$ arrays for each mode.



Matrix Dimensions

M = 2
N = IPNTRM(1,NPNTRS)-1

M = 2
N = { MYBSW if wing only
MYBSW+MYBST otherwise

14. OUTPUT FILES

The program generates three optional output files. Two of them, the AIC files, are designed for reuse with the program during subsequent executions. The program automatically searches these files and updates them with any new AIC's generated.

The optional final output file is designed to pass the generalized airforces matrices on for flutter or dynamic loads analyses. It is written optionally in the forces section of the program.

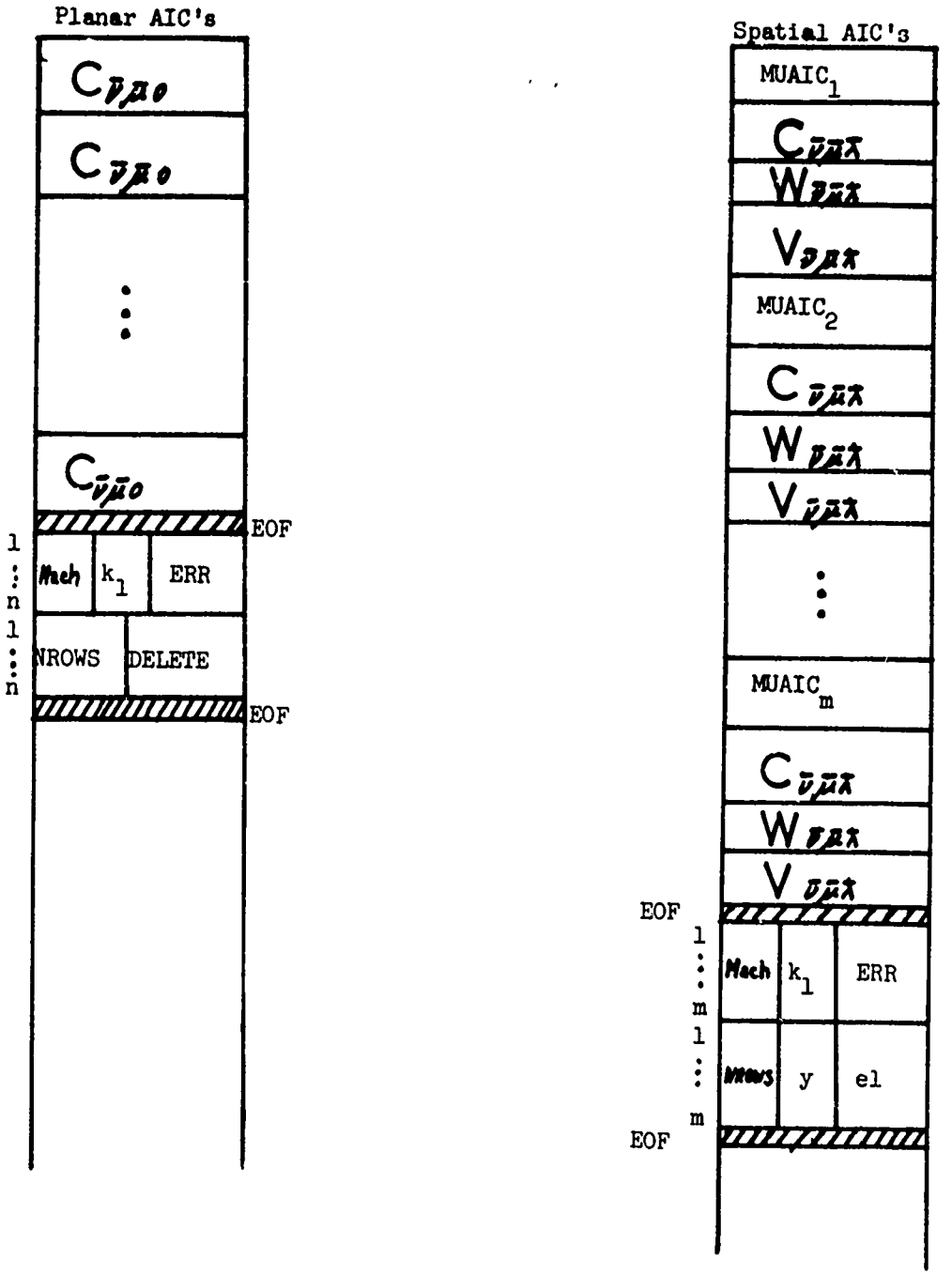


FIGURE 21. Tape Storage of AIC Arrays

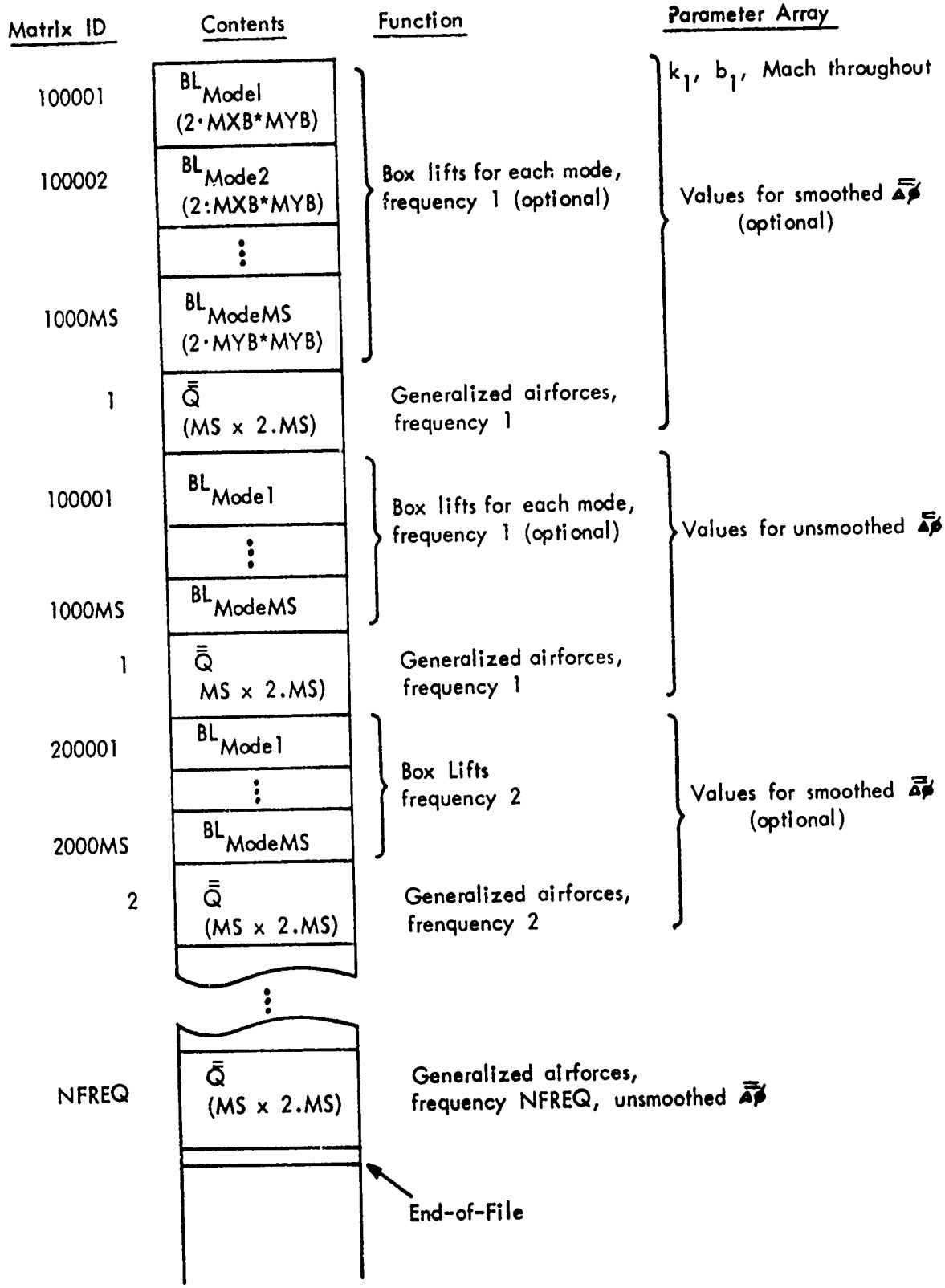


FIGURE 22. TAPE MAP OF FORCES OUTPUT TAPE

15. IMPLEMENTATION AND DEBUGGING

a. Update

The source program is written and maintained using the CDC 6600 SCOPE operating system UPDATE feature. Under UPDATE, all coding is either part of a *COMDECK or a *DECK. A *COMDECK may be replicated many times throughout the other decks. This feature is used for all global labeled common blocks and for most local common blocks, to insure that all routines needing them have identical common statements. A few subroutines which are needed in more than one overlay are also set up as *COMDECKs. The names of the *COMDECKs and *DECKs correspond as closely as possible to their Fortran identifiers - program name, subroutine name or common block name.

b. Open-ended Features

The writers of the program feel that most potential users probably have unique system features which may be utilized to optimize the execution of the program beyond its release status. With this in mind, numerous "hooks" have been coded in to make other features easy to implement.

1. All references to disk or tape files are by name, rather than by number. All file names are together in one common block, /FILES/. The internal scratch files are defined in one DATA statement in the zero overlay DRIVER, and the input, output and AIC files are defined via card input data.

2. All reading and writing of internal and external scratch files is handled by subroutines READMX and WRTEMX. These routines have several calling parameters which are unused, but available if it is desired to make use of labeling, random I.O., or level numbers. Because READMX and WRTEMX use BUFFERIN and BUFFEROUT, all files may share a common buffer area, allowing for a considerable savings in storage requirements.

3. Subroutine FLUSH is always called when a fatal error is encountered. This routine may be written to make use of any system error recovery procedure available. The release version prints a comment, flushes the OUTPUT file, and terminates with a Mode 1 error.

4. Subroutine DTIME is called between each secondary overlay. The release version returns CP time only; however, provision is made for PP time if the implementing system has that capability.

c. Debugging

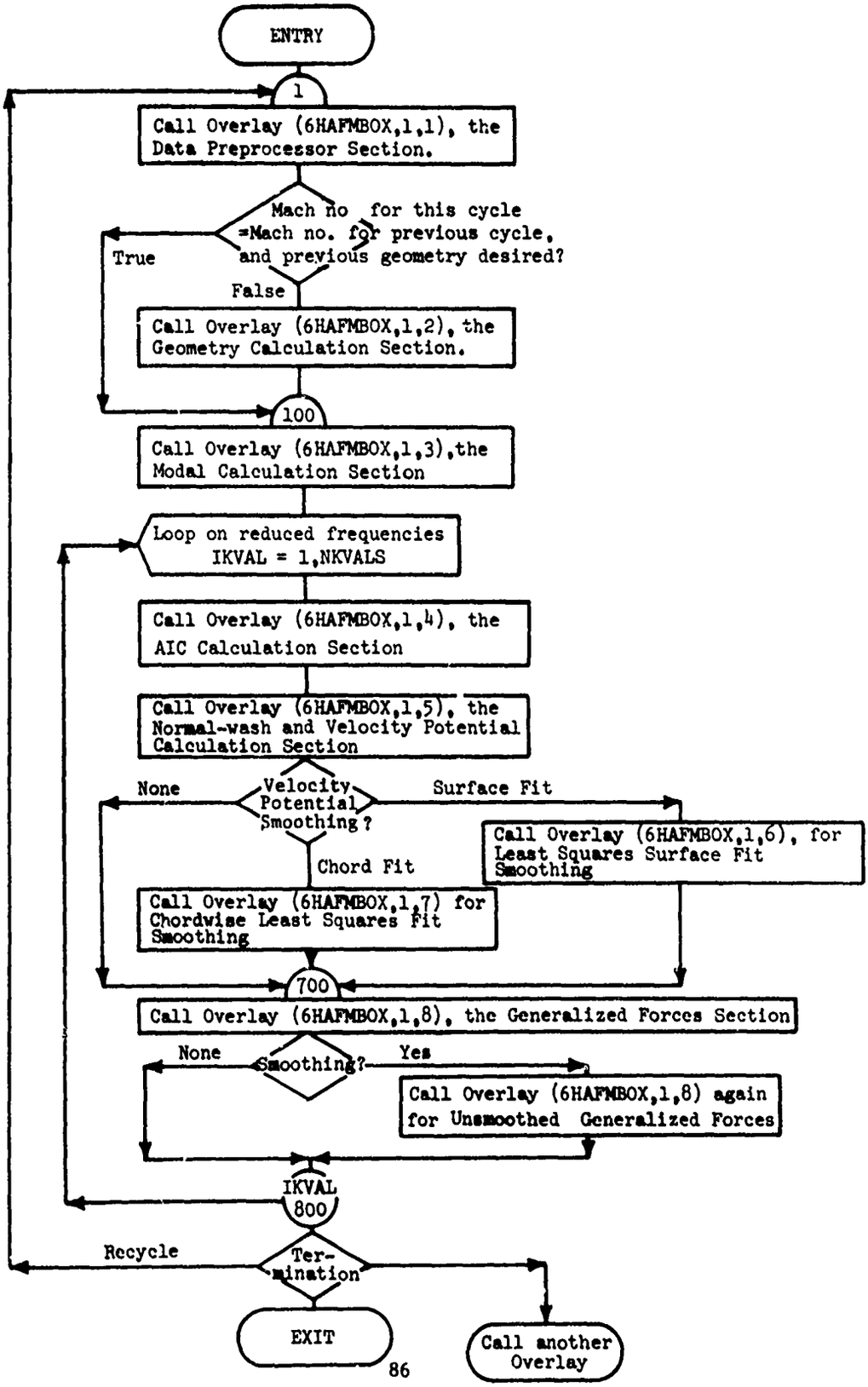
It is recommended that a new user first run one of the sample data cases, to familiarize himself with the program features and to insure

that the program gives correct answers at his installation.

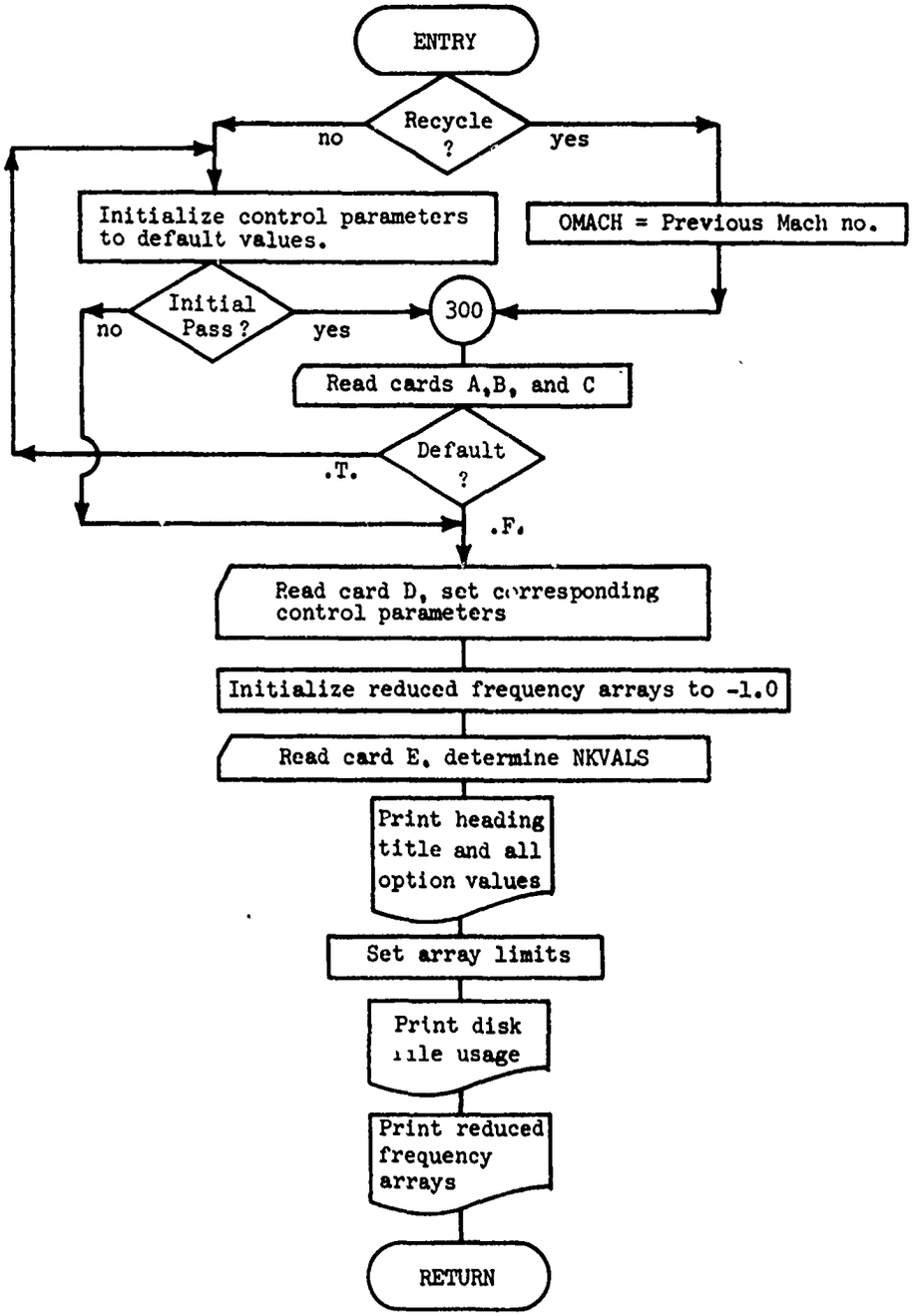
In the event the program fails "hard" (mode error, time limit, etc.), standard use of listings, load maps and dumps will usually pinpoint the cause.

If the program executes but seems to give bad numbers, additional intermediate printout may be helpful. The variables in common block /CHECKPR/ are designed to control the printing of additional check values. Each variable controls printing from one secondary overlay, so only the suspected area need be printed. The check prints provided are rudimentary, so for given problems additional prints would probably have to be written, but if they are made conditional on the common variables, they can be left in for future needs. The CHECKPR variables are all read from Card C of the data, or may be set in an executable statement after the call to DATAPP.

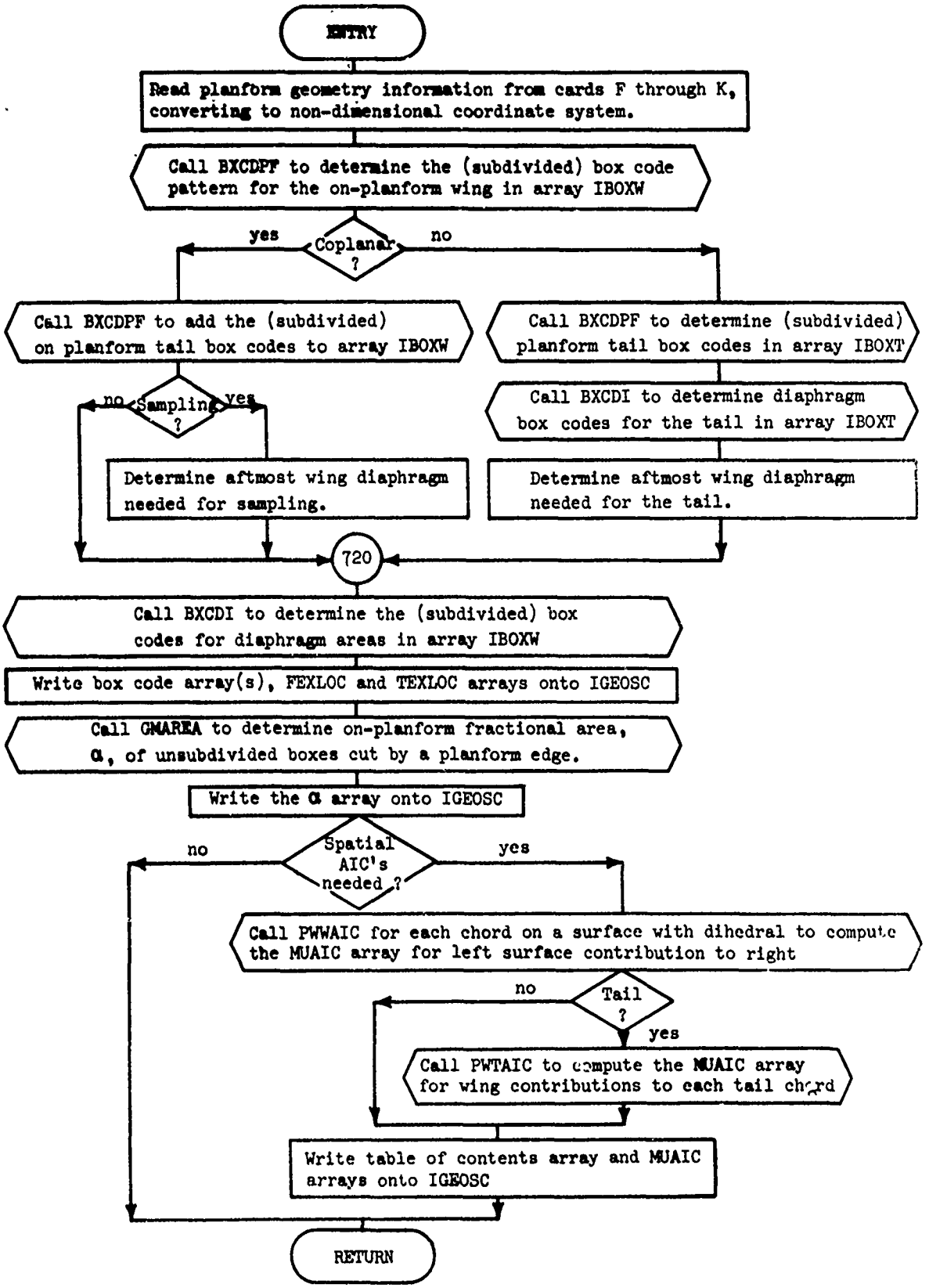
Program CONTROL — Primary level overlay which controls the program flow



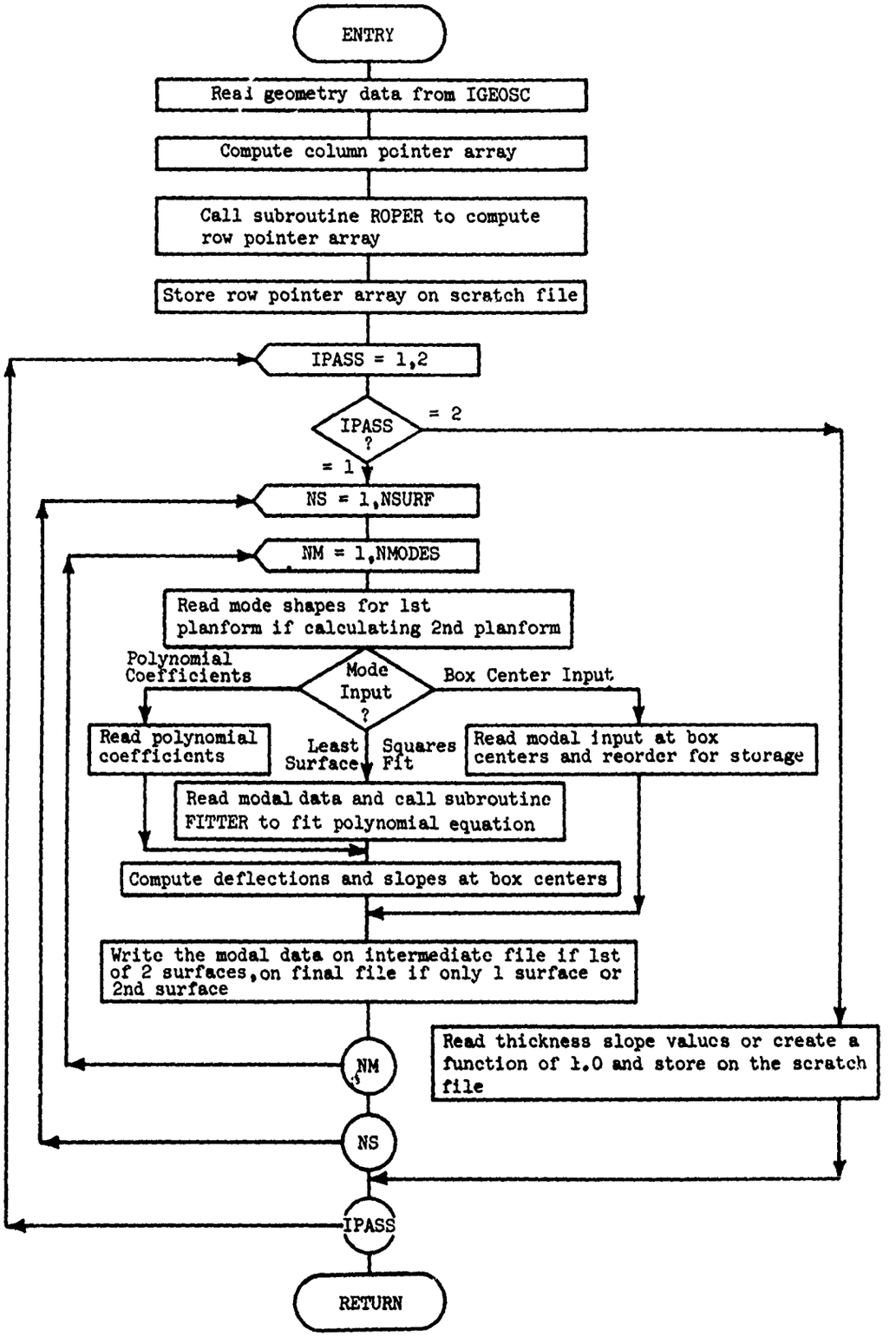
Program DATAPP — Secondary overlay which initiates control parameters as a function of defaults or card data.



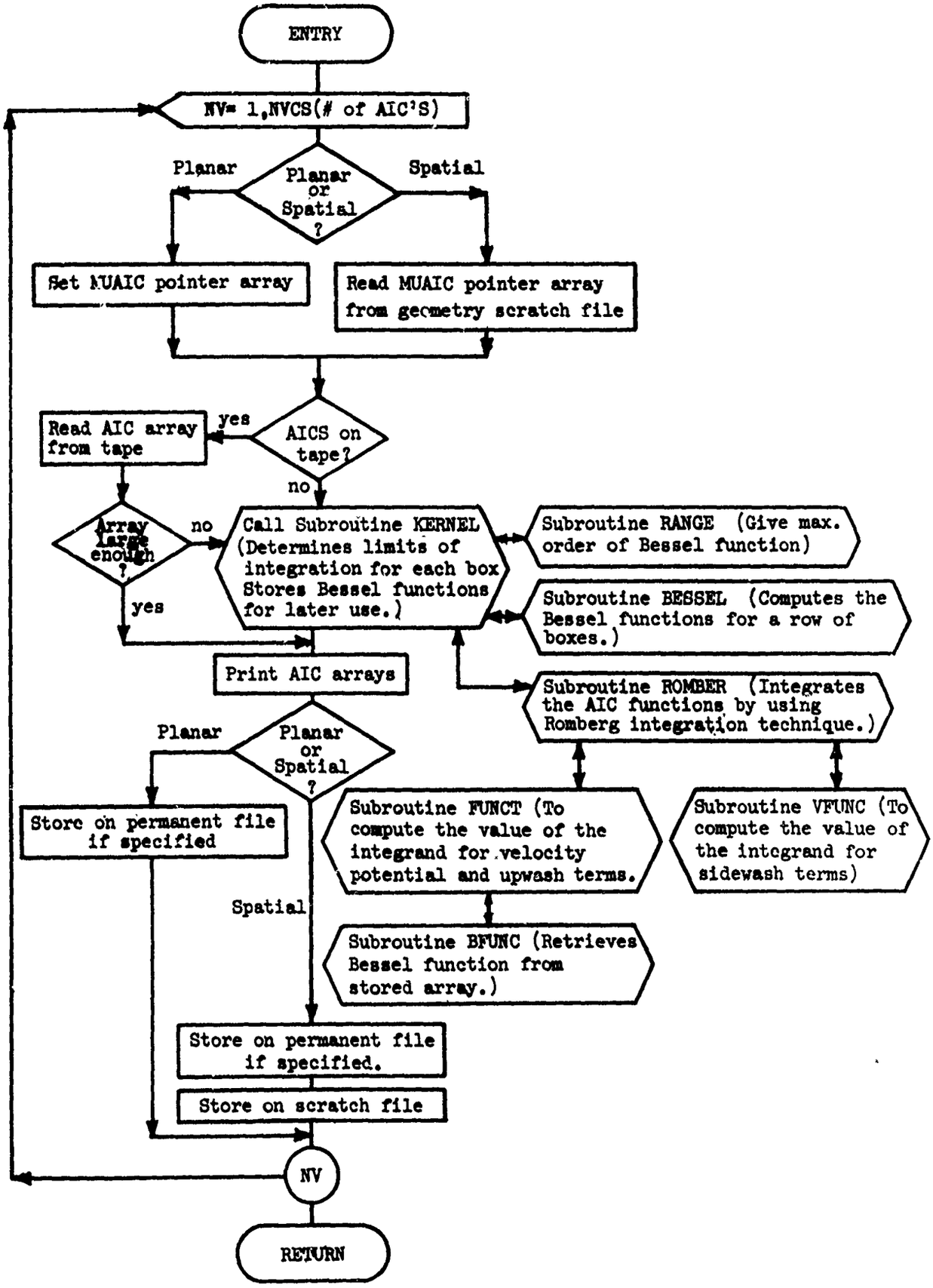
Program [redacted] —— Secondary level overlay which computes planform geometry.



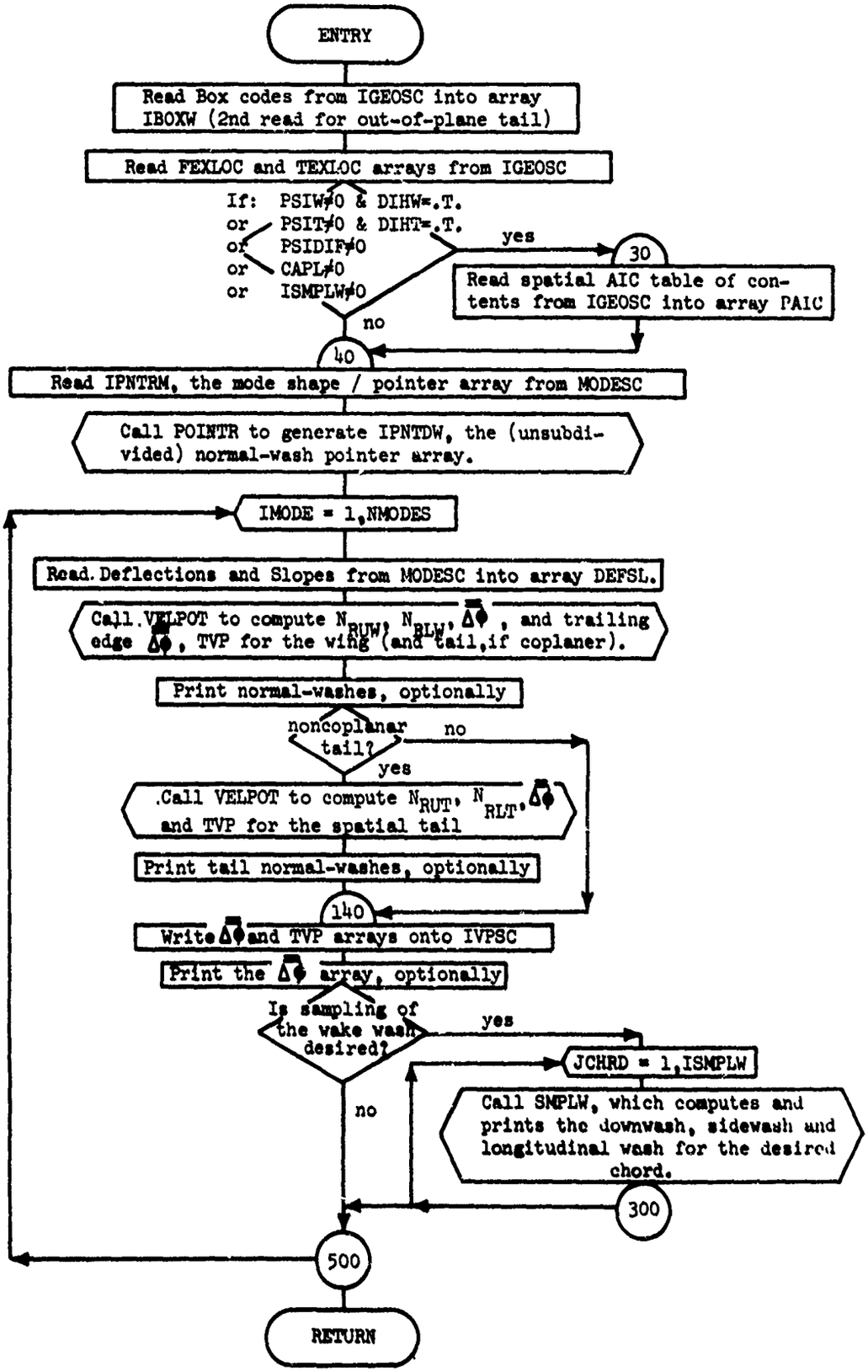
Program MODES— Secondary level overlay which reads mode shapes and thickness slope functions



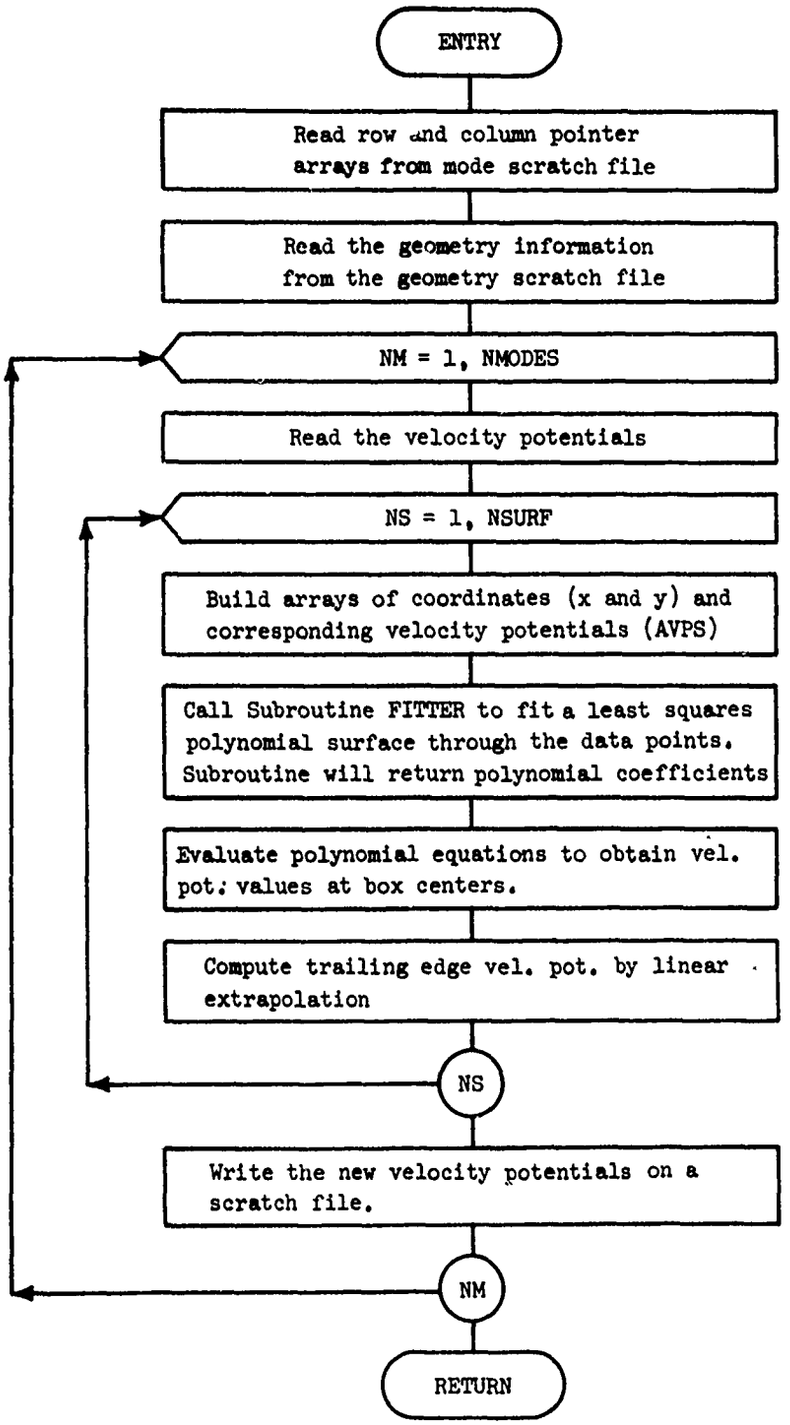
Program VICMAIN — Secondary level overlay which calculates all Aerodynamic Influence Coefficients



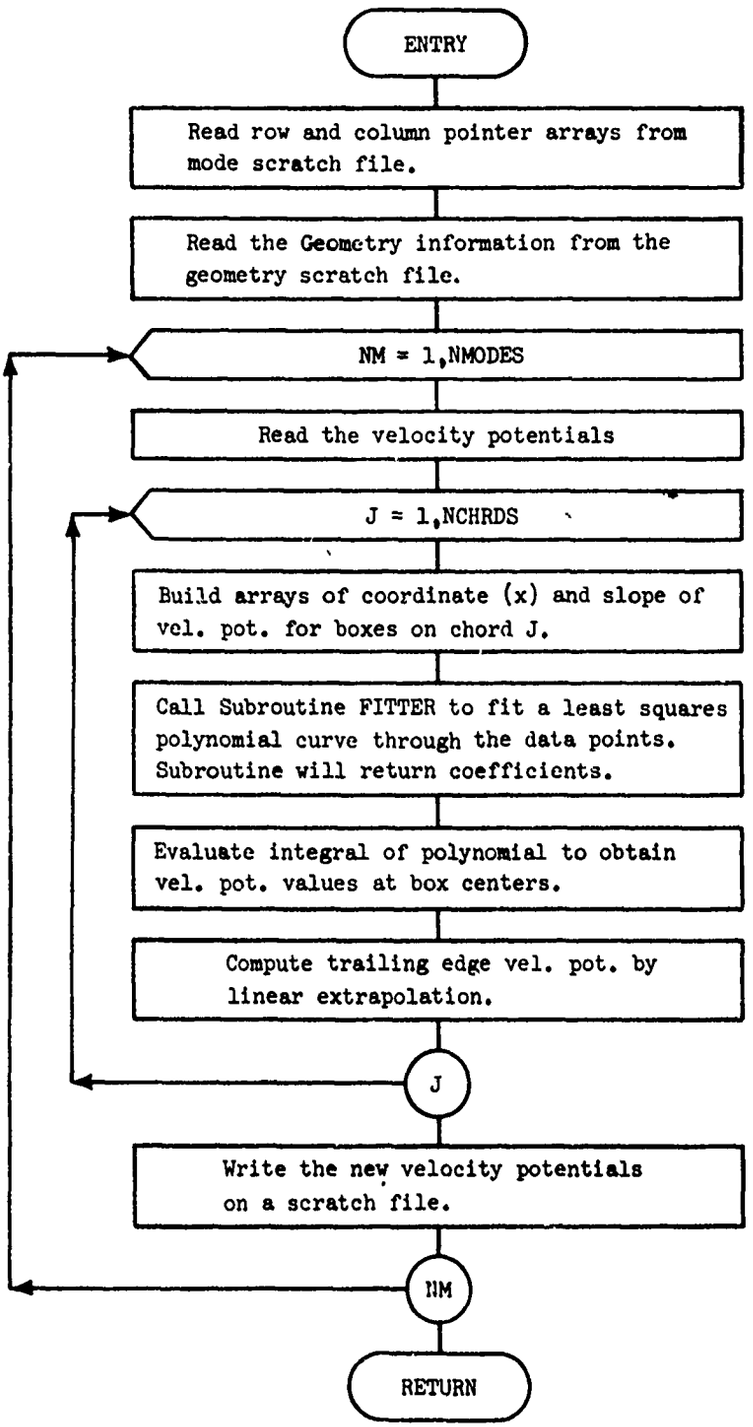
Program NWVLRT Secondary overlay which calculates normal washes and velocity potentials.



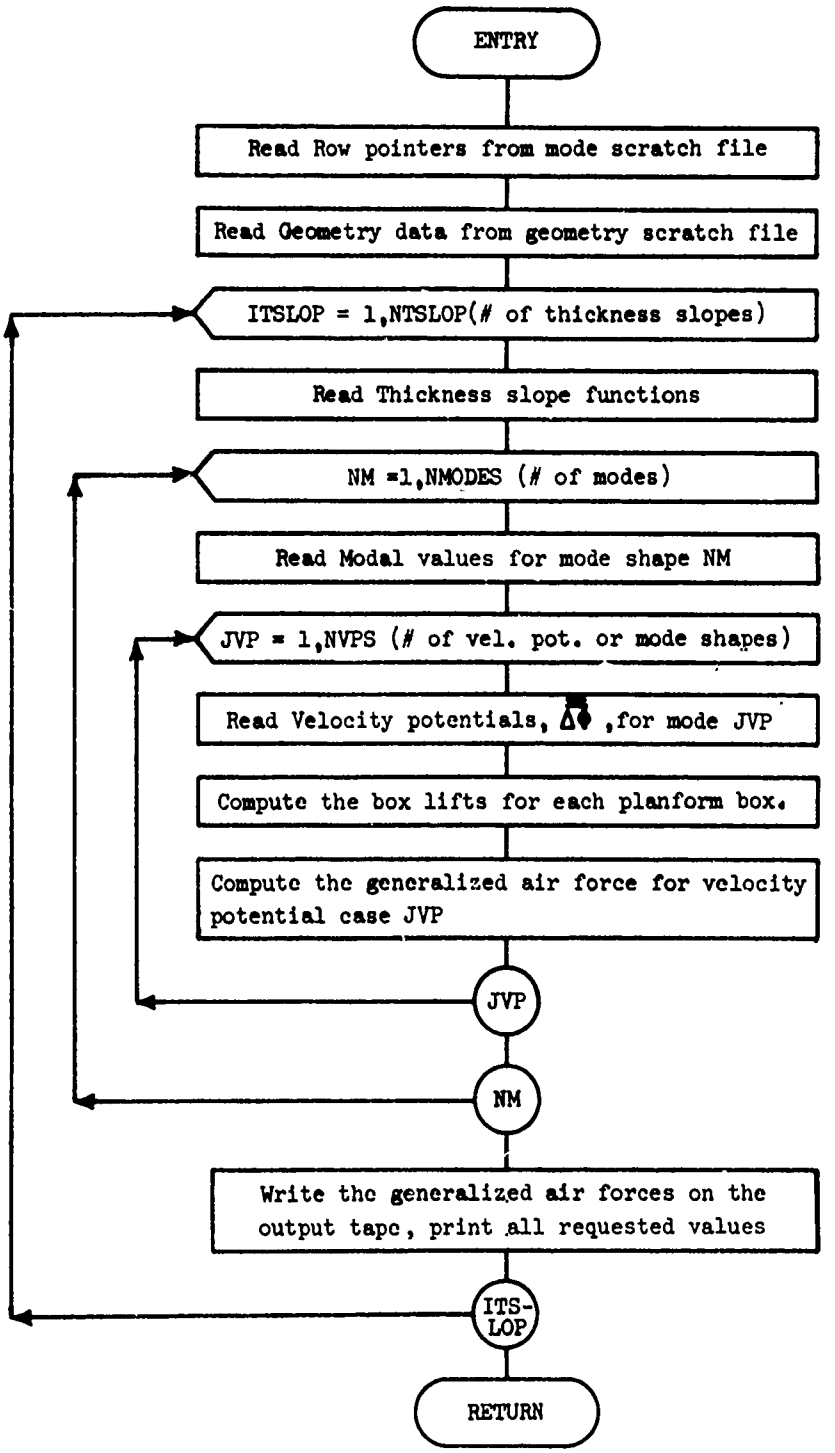
Program SMTH — Secondary overlay which smooths velocity potentials by fitting a least squares surface through them



Program CHORDF — Secondary overlay which smooths velocity potentials by fitting a least squares curve along each chord.



Program FORCES Secondary overlay which computes box lifts section lifts, and generalized air forces



REFERENCES

1. Faddeeva, V. N., Computational Methods of Linear Algebra, Dover Publications, Inc., 1959.

2. Ralston, A., And Wilf, H., Mathematical Methods for Digital Computers, Vol. 2, New York, John Wiley and Sons, 1967, pp. 133-137.

APPENDIX A

SAMPLE INPUT AND OUTPUT DATA

A simple spatial configuration, shown in Figure 23 , was chosen as a sample problem for the demonstration of the card data input and a selection of the printed output. The planform used is a pair of identical rectangular surfaces (wing and tail) with small horizontal and vertical separation.

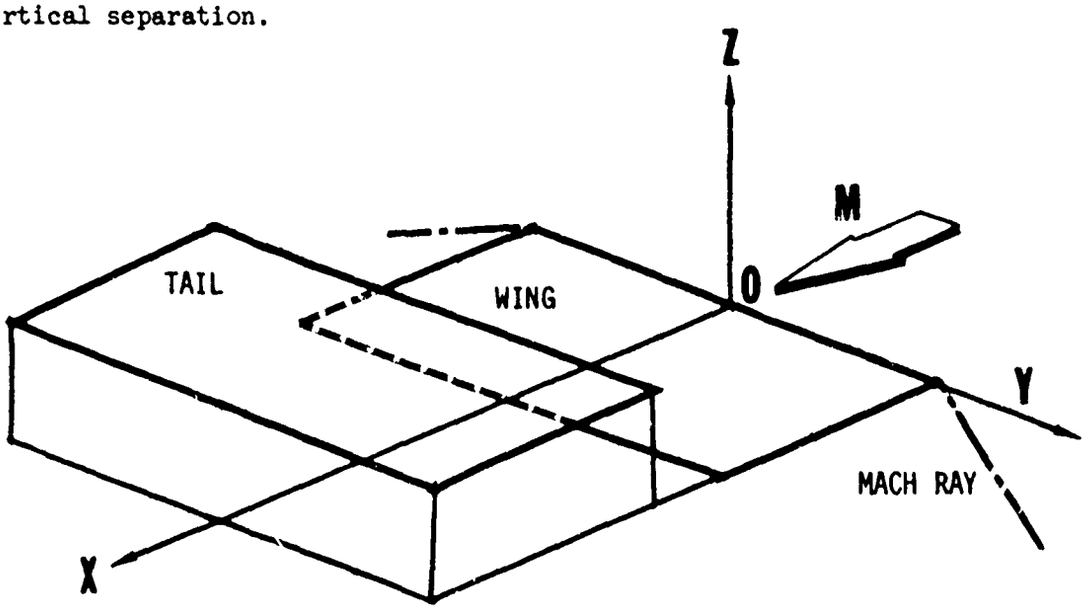


FIGURE 23 SAMPLE PROBLEM CONFIGURATION

The configuration was analyzed at Mach 1.2 for a reduced frequency (based on semi-span) of .5. Only the wing surface was allowed to oscillate, in plunging motion for mode 1 and in pitch about the wing leading edge for mode 2. These two modes were input on cards as polynomials, Chordwise velocity potential smoothing was requested.

In the interest of space the printout was edited to give samples only. A few pages of one spatial AIC array and the planar AIC are included, as well as most of the computations for mode 2 (wing pitch). Since for this configuration the upper and lower surface normal wash differs only in sign, only the upper normal washes are included. The generalized force calculations at the end are for smoothed velocity potentials.

Card Input Data

```
AFMDOX              1         0
SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
 $CARDB XMACH=1.20           $
 $CARDC SYM=1.0,MTYPEW=1,MTYPET=1,NSURF=2,WTGNAF=.T.,WTDL=.T.,
 PRGNAC=.T., PRDCF=.T.,
      PLYWOOD = .T.,
    CRDFIT=.T.,NDEG=4,
  PRGNAF=.T.,PRDL=.T.,PRSL=.T.,PRPAIC=.T.,PRSAIC=.T.,PRCOEF=.T.,
       PRDOX=.T.,PRVF=.T.,EXAIC=.F., PRNW=.T.,   PRMODS=.T.  $
 $CARDD         $
 $CARDE XKS(1) =       .50              $
 $CARDF TLAX=1.20, TLAZ=.40  $
 $CARDG NCHRDS=10, XEDGE=0.00           $
    2    2    2    2                                                  CARD H
0.        0.        0.        1.0                                     CARD I
1.0       0.0       1.0       1.0                                     CARD J
0.        0.        0.        1.0                                     CARD K
1.0       0.0       1.0       1.0                                     CARD L
 $CARDM NMODES=2 $
    2
1.        0.        0.        0.        0.        0.                  WING-1
    2
0.        1.        0.        0.        0.        0.                  WING-2
    1
0.        0.        0.                                                TAIL-1
    1
0.        0.        0.                                                TAIL-2
```

UNSTEADY AERODYNAMICS OF WING-HORIZONTAL TAIL
CONFIGURATIONS IN SUPERSONIC FLOW

PREPARED UNDER CONTRACT NO. AF 33615-70-C-1126
PROJECT NO. 1370

FOR DEPARTMENT OF THE AIR FORCE
AERONAUTICAL SYSTEMS DIVISION
AIR FORCE FLIGHT DYNAMICS LABORATORY
WRIGHT-PATTERSON AIR FORCE BASE

BY THE BOEING COMPANY
COMMERCIAL AIRPLANE DIVISION
SEATTLE, WASHINGTON

TITLE - SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS - TITLE

THE FOLLOWING OPTIONS ARE REQUESTED -

MACH NUMBER = 1.200000
SYMMETRIC ANALYSIS
PLYWOOD OPTION IS USED. (PLANFORM BOUNDARY DETERMINED BY DOX PATTERN.)
BASIC (UNSUBDIVIDED) ANALYSIS WILL BE USED
ANALYSIS FOR 2 PLANFORMS
APPROXIMATE KERNELS WILL BE USED
VELOCITY POTENTIALS WILL BE SMOOTHED BY A LEAST SQUARES
POLYNOMIAL CHORDWISE FIT, OF ORDER 4.
(0 = PROGRAM DETERMINED.)
PRINT THE DOX PATTERN
PRINT MODE SHAPE POLYNOMIAL COEFFICIENTS, IF AVAILABLE
PRINT MODE SHAPES USED
PRINT THE PLANAR AIC ARRAYS USED
PRINT THE SPATIAL AIC ARRAYS USED
PRINT NORMAL WASHES
PRINT THE VELOCITY POTENTIALS
PRINT THE DOX LIFTS
PRINT THE SECTION LIFTS
PRINT PRESSURE DIFFERENCE COEFFICIENTS

PRINT GENERALIZED AERODYNAMIC COEFFICIENTS
PRINT GENERALIZED AIR FORCES
WRITE BOX LIFTS ON TAPE
WRITE GENERALIZED AIR FORCES ON TAPE
MODAL INPUT FOR WING IS POLYNOMIAL COEFFICIENTS
MODAL INPUT FOR TAIL IS POLYNOMIAL COEFFICIENTS
DIHEDRAL WING INFLUENCE CALCULATED
DIHEDRAL TAIL INFLUENCE CALCULATED

THE FOLLOWING TAPE SETUP IS REQUESTED -

OLD AIC TAPE = 0
NEW AIC TAPE = 0
OLD SPATIAL AIC TAPE = 0
NEW SPATIAL AIC TAPE = 0
INPUT DATA TAPE = 0 SPACED 0 FILES,
OUTPUT TAPE = 1 SPACED 0 FILES,

THE FOLLOWING IS THE REDUCED FREQUENCY ARRAY BASED ON WING SEMI-SPAN

.50000

ENTERING PROGRAM GEOM CURRENT ELAPSED TIME IS CP = .224, PP = 37.757

- - - - GEOMETRIC PARAMETERS - - - -

CARDF -LOCAL AXES DEFINITION-		X-LOCATION	Z-LOCATION	DIHEDRAL ANGLE (PSI)
	WING	0.000	0.000	0.00 DEGREES
	TAIL	1.200	.400	0.00 DEGREES

CARDG -BOX PATTERN DEFINITION-	NCHRDS	XCENTR	OR XEDGE
	10	*0000.0000	0.0000

CARDH -PLANFORM DEFINITION POINT COUNTS-		LEADING EDGE	TRAILING EDGE
	WING	2	2
	TAIL	2	2

CARDI TO CARDL -PLANFORM DEFINITIONS-		X	Y (LOCAL AXES)
	WING L.E.	0.000	0.000
		0.000	1.000

WING T.C.	1.000	0.000
	1.000	1.000
TAIL L.E.	0.000	0.000
	0.000	1.000
TAIL T.E.	1.000	0.000
	1.000	1.000

-BOX DIMENSIONS- D1 (LENGTH) = 6.63324958E-02 D1/DETA (WIDTH) = 1.00000000E-01

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS

BOX CODE PATTERN
MACH 1.2000000

CODE - 1 = PLANFORM BOX
2 = DIAPHRAGM BOX
3 = WAKE BOX

	2	4	6	8	10	12	14	16
19	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	2
21	1	1	1	1	1	1	2	2
22	1	1	1	1	1	1	2	2
23	1	1	1	1	1	1	2	2
24	1	1	1	1	1	1	2	2
25	1	1	1	1	1	1	2	2
26	1	1	1	1	1	1	2	2
27	1	1	1	1	1	1	2	2
28	1	1	1	1	1	1	2	2
29	1	1	1	1	1	1	2	2
30	1	1	1	1	1	1	2	2
31	1	1	1	1	1	1	2	2
32	1	1	1	1	1	1	2	
33	1	1	1	1	1	1		

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS

BOX CODE PATTERN
MACH 1.2000000

CODE - 1 = PLANFORM BOX
2 = DIAPHRAGM BOX
3 = WAKE BOX

```
    2  4  6  8 10 12 14 16 18 20 22 24 26

 1  1 1 1 1 1 1 1 1 1 1
 2  1 1 1 1 1 1 1 1 1 1 2
 3  1 1 1 1 1 1 1 1 1 1 2 2
 4  1 1 1 1 1 1 1 1 1 1 2 2 2
 5  1 1 1 1 1 1 1 1 1 1 2 2 2 2
 6  1 1 1 1 1 1 1 1 1 1 2 2 2 2 2
 7  1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2
 8  1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2
 9  1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2
10  1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2
11  1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2
12  1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2
13  1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2
14  1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2
15  1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2
16  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2
17  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
18  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
19  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
20  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
21  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2
22  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2
23  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2
24  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2
25  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2
26  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2
27  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2
28  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2
29  3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2
```

ENTERING PROGRAM MODES CURRENT ELAPSED TIME IS CP = 1.894, PP = 40.123

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS

MODE SHAPE NUMBER 2
MACH NUMBER = 1.200000

MODAL POLYNOMIAL COEFFICIENTS FROM CARD INPUT

CONSTANT
0.

X **1Y **0 | X **0Y **1
1.0000E+00 | 0.

X **2Y **0 | X **1Y **1 | X **0Y **2
0. | 0. | 0.

MODAL POLYNOMIAL COEFFICIENTS FROM CARD INPUT

CONSTANT
0.

X **1Y **0 | X **0Y **1
0. | 0.

DEFLECTIONS X 1.0E 1

	1	2	3	4	5	6	7	8	9	10
1	.332	.332	.332	.332	.332	.332	.332	.332	.332	.332
2	.995	.995	.995	.995	.995	.995	.995	.995	.995	.995
3	1.658	1.658	1.658	1.658	1.658	1.658	1.658	1.658	1.658	1.658
4	2.322	2.322	2.322	2.322	2.322	2.322	2.322	2.322	2.322	2.322
5	2.985	2.985	2.985	2.985	2.985	2.985	2.985	2.985	2.985	2.985
6	3.648	3.648	3.648	3.648	3.648	3.648	3.648	3.648	3.648	3.648
7	4.312	4.312	4.312	4.312	4.312	4.312	4.312	4.312	4.312	4.312
8	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975
9	5.638	5.638	5.638	5.638	5.638	5.638	5.638	5.638	5.638	5.638

10	6.302	6.302	6.302	6.302	6.302	6.302	6.302	6.302	6.302	6.302
11	6.965	6.965	6.965	6.965	6.965	6.965	6.965	6.965	6.965	6.965
12	7.628	7.628	7.628	7.628	7.628	7.628	7.628	7.628	7.628	7.628
13	8.292	8.292	8.292	8.292	8.292	8.292	8.292	8.292	8.292	8.292
14	8.955	8.955	8.955	8.955	8.955	8.955	8.955	8.955	8.955	8.955
15	9.618	9.618	9.618	9.618	9.618	9.618	9.618	9.618	9.618	9.618
19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
31	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
32	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
33	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

SLOPES X 1.0E 0

	1	2	3	4	5	6	7	8	9	10
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
5	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
6	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
7	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
8	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
9	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
10	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
11	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
31	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
32	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
33	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

ENTERING PROGRAM AIC CURRENT ELAPSED TIME IS CP = 2.555, PP = 44.910

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS

AIC CALCULATIONS

MACH = 1.20000 K1 = .0331662 ERR = 1.00000E-02 EL = 4.00 YBAR = 0.00

MJ	MU	C VELOCITY POTENTIAL COEFFICIENT		W UPWASH COEFFICIENT		V SIDEWASH COEFFICIENT	
0	0	0.	0.	0.	0.	0.	0.
1	1	0.	0.	0.	0.	0.	0.
1	0	0.	0.	0.	0.	0.	0.
1	-1	0.	0.	0.	0.	0.	0.
2	2	0.	0.	0.	0.	0.	0.
2	1	0.	0.	0.	0.	0.	0.
2	0	0.	0.	0.	0.	0.	0.
2	-1	0.	0.	0.	0.	0.	0.
2	-2	0.	0.	0.	0.	0.	0.
3	3	0.	0.	0.	0.	0.	0.
3	2	0.	0.	0.	0.	0.	0.
3	1	0.	0.	0.	0.	0.	0.
3	0	0.	0.	0.	0.	0.	0.
3	-1	0.	0.	0.	0.	0.	0.
3	-2	0.	0.	0.	0.	0.	0.
3	-3	0.	0.	0.	0.	0.	0.
4	4	0.	0.	0.	0.	0.	0.
4	3	0.	0.	0.	0.	0.	0.
4	2	-3.47636677E-02	1.80224368E-02	1.97268081E-01	-1.00363164E-01	9.19532598E-02	-4.69384667E-02
4	1	-1.17760029E-01	5.85388468E-02	1.72703458E-01	-7.56330976E-02	4.39228951E-02	-1.94380883E-02
4	0	-1.39653064E-01	6.82985240E-02	1.59648216E-01	-6.50348287E-02	0.	0.
4	-1	-1.17760029E-01	5.85388468E-02	1.72703458E-01	-7.56330976E-02	-4.39228951E-02	1.94380883E-02
4	-2	-3.47636677E-02	1.80224368E-02	1.97268081E-01	-1.00363164E-01	-9.19532598E-02	4.69384667E-02
4	-3	0.	0.	0.	0.	0.	0.
4	-4	0.	0.	0.	0.	0.	0.
5	5	0.	0.	0.	0.	0.	0.
5	4	-1.26580111E-02	8.45618922E-03	7.57086924E-02	-4.99682786E-02	6.96685870E-02	-4.60082949E-02
5	3	-1.16088951E-01	7.25678775E-02	1.10641214E-01	-6.02286065E-02	8.38256078E-02	-4.59949061E-02
5	2	-1.45526451E-01	8.55703207E-02	-9.83107500E-02	5.93665069E-02	-4.25224207E-02	2.62689346E-02
5	1	-9.96538896E-02	5.92204335E-02	-6.88337551E-02	3.97750794E-02	-1.80453789E-02	1.04152589E-02
5	0	-9.18644239E-02	5.46812863E-02	-5.23885439E-02	3.04815076E-02	0.	0.
5	-1	-9.96538896E-02	5.92204335E-02	-6.88337551E-02	3.97750794E-02	1.80453789E-02	-1.04152589E-02

5	-2	-1.45526451E-01	8.55703207E-02	-9.83107500E-02	5.93665069E-02	4.25224207E-02	-2.62689346E-02
5	-3	-1.16088951E-01	7.25678775E-02	1.10641214E-01	-6.02286065E-02	-8.38256078E-02	4.59949061E-02
5	-4	-1.26580111E-02	8.45618922E-03	7.57086924E-02	-4.99682786E-02	-6.96685870E-02	4.60082949E-02
5	-5	0.	0.	0.	0.	0.	0.
6	6	0.	0.	0.	0.	0.	0.
6	5	-3.99220293E-02	3.25890518E-02	7.99613225E-02	-6.33037310E-02	9.80050144E-02	-7.77761878E-02
6	4	-1.21957220E-01	9.22166540E-02	-6.92810630E-03	9.28625574E-03	-7.56361388E-04	4.98241475E-03
6	3	-7.78882128E-02	5.86123874E-02	-4.00640646E-02	2.94590784E-02	-3.10389954E-02	2.28078724E-02
6	2	-6.07096937E-02	4.58905554E-02	-1.87613792E-02	1.39987792E-02	-9.54362988E-03	7.11917814E-03
6	1	-5.45262136E-02	4.12685264E-02	-1.40850668E-02	1.05505943E-02	-3.56932071E-03	2.67317908E-03
6	0	-5.28116078E-02	3.99887087E-02	-1.29745459E-02	9.72827152E-03	0.	0.
6	-1	-5.45262136E-02	4.12685264E-02	-1.40850668E-02	1.05505943E-02	3.56932071E-03	-2.67317908E-03
6	-2	-6.07096937E-02	4.58905554E-02	-1.87613792E-02	1.39987792E-02	9.54362988E-03	-7.11917814E-03
6	-3	-7.78882128E-02	5.86123874E-02	-4.00640646E-02	2.94590784E-02	3.10389954E-02	-2.28078724E-02
6	-4	-1.21957220E-01	9.22166540E-02	-6.92810630E-03	9.28625574E-03	7.56361388E-04	-4.98241475E-03
6	-5	-3.99220293E-02	3.25890518E-02	7.99613225E-02	-6.33037310E-02	-9.80050144E-02	7.77761878E-02
6	-6	0.	0.	0.	0.	0.	0.
7	7	0.	0.	0.	0.	0.	0.
7	6	-5.56430474E-02	5.54322101E-02	6.75641236E-02	-6.43952032E-02	1.02001591E-01	-9.75864803E-02
7	5	-9.31703898E-02	8.69860745E-02	-3.18547641E-02	3.11225707E-02	-3.78738988E-02	3.73390401E-02
7	4	-5.41942395E-02	5.10205307E-02	-1.66531945E-02	1.54504087E-02	-1.69471710E-02	1.57190079E-02
7	3	-4.33217879E-02	4.08912504E-02	-9.20008406E-03	8.60658871E-03	-6.97408521E-03	6.52337914E-03
7	2	-3.83083684E-02	3.61961147E-02	-6.86176794E-03	6.43842195E-03	-3.45857670E-03	3.24490770E-03
7	1	-3.58922648E-02	3.39267375E-02	-5.92213712E-03	5.56399165E-03	-1.49063517E-03	1.40038141E-03
7	0	-3.51605591E-02	3.32385738E-02	-5.65911048E-03	5.31886725E-03	0.	0.
7	-1	-3.58922648E-02	3.39267375E-02	-5.92213712E-03	5.56399165E-03	1.49063517E-03	-1.40038141E-03
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7	-3	-4.33217879E-02	4.08912504E-02	-9.20008406E-03	8.60658871E-03	6.97408521E-03	-6.52337914E-03
7	-4	-5.41942395E-02	5.10205307E-02	-1.66531945E-02	1.54504087E-02	1.69471710E-02	-1.57190079E-02
7	-5	-9.31703898E-02	8.69860745E-02	-3.18547641E-02	3.11225707E-02	3.78738988E-02	-3.73390401E-02
7	-6	-5.56430474E-02	5.54322101E-02	6.75641236E-02	-6.43952032E-02	-1.02001591E-01	9.75864803E-02
7	-7	0.	0.	0.	0.	0.	0.
8	8	0.	0.	0.	0.	0.	0.
8	7	-6.15398979E-02	7.51517780E-02	5.40298073E-02	-6.23899846E-02	9.63065278E-02	-1.11734727E-01
8	6	-6.73784527E-02	7.80656965E-02	-3.25854394E-02	3.74499354E-02	-4.95508943E-02	5.69967196E-02
8	5	-4.01354093E-02	4.70355698E-02	-9.19908547E-03	1.06595010E-02	-1.16230536E-02	1.34631701E-02
8	4	-3.22017048E-02	3.78151778E-02	-5.39386189E-03	6.29013614E-03	-5.42663640E-03	6.32648970E-03
8	3	-2.81043413E-02	3.30316117E-02	-4.00938435E-03	4.68713806E-03	-3.02277022E-03	3.53340678E-03
8	2	-2.57852135E-02	3.03201599E-02	-3.36133177E-03	3.93376837E-03	-1.69069170E-03	1.97892725E-03
8	1	-2.45666888E-02	2.88944759E-02	-3.05520421E-03	3.57709645E-03	-7.69124580E-04	9.00832388E-04
8	0	-2.41845845E-02	2.84472780E-02	-2.96375479E-03	3.47043774E-03	0.	0.
8	-1	-2.45666888E-02	2.88944759E-02	-3.05520421E-03	3.57709645E-03	7.69124580E-04	-9.00832388E-04
8	-2	-2.57852135E-02	3.03201599E-02	-3.36133177E-03	3.93376837E-03	1.69069170E-03	-1.97892725E-03
8	-3	-2.81043413E-02	3.30316117E-02	-4.00938435E-03	4.68713806E-03	3.02277022E-03	-3.53340678E-03

8	-4	-3.22017048E-02	3.78151778E-02	-5.39386189E-03	6.29013614E-03	5.42663640E-03	-6.32648970E-03
8	-5	-4.01354093E-02	4.70355698E-02	-9.19908547E-03	1.06595010E-02	1.16230536E-02	-1.34631701E-02
8	-6	-6.73784527E-02	7.80656965E-02	-3.25854394E-02	3.74499354E-02	4.95508943E-02	-5.69967196E-02
8	-7	-6.15398979E-02	7.51517780E-02	5.40298073E-02	-6.23899846E-02	-9.63065278E-02	1.11734727E-01
8	-8	0.	0.	0.	0.	0.	0.
9	9	-1.91016241E-03	3.15651003E-03	1.15527028E-02	-1.89580107E-02	2.47730250E-02	-4.06551126E-02
9	8	-5.86648472E-02	8.86101458E-02	3.03279382E-02	-4.02846159E-02	6.10248666E-02	-8.14001675E-02
9	7	-4.70533895E-02	6.85290523E-02	-2.81140335E-02	3.91520514E-02	-5.09766547E-02	7.09297045E-02
9	6	-3.00275403E-02	4.41209153E-02	-5.61154846E-03	8.16167676E-03	-8.49377385E-03	1.23522917E-02
9	5	-2.40234205E-02	3.53650017E-02	-3.39587159E-03	4.96731463E-03	-4.27067600E-03	6.24658295E-03
9	4	-2.07188137E-02	3.05236820E-02	-2.52526002E-03	3.70316867E-03	-2.53739828E-03	3.72083317E-03
9	3	-1.87015916E-02	2.75632483E-02	-2.09005804E-03	3.06910987E-03	-1.57403477E-03	2.31130132E-03
9	2	-1.74665924E-02	2.57489776E-02	-1.85517066E-03	2.72626338E-03	-9.31089214E-04	1.36824996E-03
9	1	-1.67912920E-02	2.47563781E-02	-1.73608954E-03	2.55227390E-03	-4.35582028E-04	6.40348400E-04
9	0	-1.65760411E-02	2.44396386E-02	-1.69936650E-03	2.49868926E-03	0.	0.
9	-1	-1.67912920E-02	2.47563781E-02	-1.73608954E-03	2.55227390E-03	4.35582028E-04	-6.40348400E-04
9	-2	-1.74665924E-02	2.57489776E-02	-1.85517066E-03	2.72626338E-03	9.31089214E-04	-1.36824996E-03
9	-3	-1.87015916E-02	2.75632483E-02	-2.09005804E-03	3.06910987E-03	1.57403477E-03	-2.31130132E-03
9	-4	-2.07188137E-02	3.05236820E-02	-2.52526002E-03	3.70316867E-03	2.53739828E-03	-3.72083317E-03
9	-5	-2.40234205E-02	3.53650017E-02	-3.39587159E-03	4.96731463E-03	4.27067600E-03	-6.24658295E-03
9	-6	-3.00275403E-02	4.41209153E-02	-5.61154846E-03	8.16167676E-03	8.49377385E-03	-1.23522917E-02
9	-7	-4.70533895E-02	6.85290523E-02	-2.81140335E-02	3.91520514E-02	5.09766547E-02	-7.09297045E-02
9	-8	-5.86648472E-02	8.86101458E-02	3.03279382E-02	-4.02846159E-02	-6.10248666E-02	8.14001675E-02
9	-9	-1.91016241E-03	3.15651003E-03	1.15527028E-02	-1.89580107E-02	-2.47730250E-02	4.06551126E-02
10	10	-3.58627167E-03	7.62974673E-03	1.09058621E-02	-2.28652507E-02	2.62746278E-02	-5.50987357E-02
10	9	-4.93988861E-02	9.47024542E-02	9.04988294E-03	-1.38232848E-02	2.17318192E-02	-3.36454123E-02
10	8	-3.33746722E-02	6.23050284E-02	-1.09548255E-02	1.99039991E-02	-2.23138428E-02	4.05252958E-02
10	7	-2.21584032E-02	4.16558268E-02	-3.55573550E-03	6.61879222E-03	-6.26813064E-03	1.16666287E-02
10	6	-1.76192213E-02	3.31835546E-02	-2.19659456E-03	4.11200149E-03	-3.31123875E-03	6.19830177E-03
10	5	-1.50088829E-02	2.82895513E-02	-1.63392090E-03	3.06670134E-03	-2.05037048E-03	3.84821408E-03
10	4	-1.33396297E-02	2.51540349E-02	-1.34059486E-03	2.51982266E-03	-1.34506727E-03	2.52817137E-03
10	3	-1.22400154E-02	2.30862162E-02	-1.17199983E-03	2.20484437E-03	-8.81650890E-04	1.65859036E-03
10	2	-1.15371879E-02	2.17636565E-02	-1.07358237E-03	2.02074685E-03	-5.38313642E-04	1.01322333E-03
10	1	-1.11435376E-02	2.10226062E-02	-1.02145635E-03	1.92317085E-03	-2.56065080E-04	4.82105711E-04
10	0	-1.10166619E-02	2.07835674E-02	-1.00506137E-03	1.89252180E-03	0.	0.
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10	-3	-1.22400154E-02	2.30862162E-02	-1.17199983E-03	2.20484437E-03	8.81650890E-04	-1.65859036E-03
10	-4	-1.33396297E-02	2.51540349E-02	-1.34059486E-03	2.51982266E-03	1.34506727E-03	-2.52817137E-03
10	-5	-1.50088829E-02	2.82895513E-02	-1.63392090E-03	3.06670134E-03	2.05037048E-03	-3.84821408E-03
10	-6	-1.76192213E-02	3.31835546E-02	-2.19659456E-03	4.11200149E-03	3.31123875E-03	-6.19830177E-03
10	-7	-2.21584032E-02	4.16558268E-02	-3.55573550E-03	6.61879222E-03	6.26813064E-03	-1.16666287E-02
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11	11	-4.18639975E-03	1.20663134E-02	8.56562552E-03	-2.40799525E-02	2.28776961E-02	-6.43417919E-02
11	10	-3.78975536E-02	9.62892728E-02	3.27966726E-03	-4.93045524E-03	9.24313571E-03	-1.47902829E-02
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11	7	-1.23991352E-02	3.10821435E-02	-1.40397486E-03	3.49756058E-03	-2.46718435E-03	6.14591930E-03
11	6	-1.04283274E-02	2.61643294E-02	-1.04472019E-03	2.61029182E-03	-1.57217571E-03	3.92804894E-03
11	5	-9.12851150E-03	2.29137463E-02	-8.52110504E-04	2.13263015E-03	-1.06807888E-03	2.67308894E-03
11	4	-8.23503168E-03	2.06763761E-02	-7.37344164E-04	1.84731796E-03	-7.39176940E-04	1.85187834E-03
11	3	-7.62074435E-03	1.91368493E-02	-6.65957676E-04	1.66957404E-03	-5.00633487E-04	1.25508447E-03
11	2	-7.21772822E-03	1.81262757E-02	-6.22218396E-04	1.56056085E-03	-3.11809922E-04	7.82028633E-04
11	1	-6.98853946E-03	1.75513977E-02	-5.98386689E-04	1.50112902E-03	-1.49927951E-04	3.76109275E-04
11	0	-6.91414032E-03	1.73646556E-02	-5.90791626E-04	1.48221511E-03	0.	0.
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11	-11	-4.18639975E-03	1.20663134E-02	8.56562552E-03	-2.40799525E-02	-2.28776961E-02	6.43417919E-02
12	12	-3.72776720E-03	1.60634916E-02	5.82061141E-03	-2.40293415E-02	1.70533830E-02	-7.04581208E-02
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12	10	-1.52506711E-02	5.43187266E-02	-3.38304633E-03	1.16880687E-02	-8.55318683E-03	2.95400203E-02
12	9	-1.03153072E-02	3.70290494E-02	-1.33820525E-03	4.74458787E-03	-3.02684968E-03	1.07305559E-02
12	8	-8.05661541E-03	2.89904861E-02	-8.46758430E-04	3.02522663E-03	-1.69955143E-03	6.07168542E-03
12	7	-6.68576228E-03	2.40828451E-02	-6.30077270E-04	2.25950416E-03	-1.10566569E-03	3.96486125E-03
12	6	-5.76180714E-03	2.07657237E-02	-5.11573400E-04	1.83850727E-03	-7.69132814E-04	2.76406283E-03
12	5	-5.10897888E-03	1.84179437E-02	-4.39299702E-04	1.58092128E-03	-5.50263143E-04	1.98021174E-03
12	4	-4.64105922E-03	1.67332808E-02	-3.92716140E-04	1.41454784E-03	-3.93483559E-04	1.41729147E-03
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12	1	-3.96345727E-03	1.42911603E-02	-3.32229523E-04	1.19809594E-03	-8.32140693E-05	3.00086475E-04
12	0	-3.92213375E-03	1.41420631E-02	-3.28781103E-04	1.18576433E-03	0.	0.
12	-1	-3.96345727E-03	1.42911603E-02	-3.32229523E-04	1.19809594E-03	8.32140693E-05	-3.00086475E-04
12	-2	-4.09014224E-03	1.47479566E-02	-3.42948235E-04	1.23648864E-03	1.71797790E-04	-6.19405321E-04
12	-3	-4.31064695E-03	1.55428127E-02	-3.62239121E-04	1.30554646E-03	2.72196355E-04	-9.81011826E-04
12	-4	-4.64105922E-03	1.67332808E-02	-3.92716140E-04	1.41454784E-03	3.93483559E-04	-1.41729147E-03
12	-5	-5.10897888E-03	1.84179437E-02	-4.39299702E-04	1.58092128E-03	5.50263143E-04	-1.98021174E-03
12	-6	-5.76180714E-03	2.07657237E-02	-5.11573400E-04	1.83850727E-03	7.69132814E-04	-2.76406283E-03
12	-7	-6.68576228E-03	2.40828451E-02	-6.30077270E-04	2.25950416E-03	1.10566569E-03	-3.96486125E-03

12	-8	-8.05661541E-03	2.89954861E-02	-8.46758430E-04	3.02522663E-03	1.69955143E-03	-6.07168542E-03
12	-9	-1.03153072E-02	3.70290494E-02	-1.33820525E-03	4.74458787E-03	3.02684968E-03	-1.07305559E-02
12	-10	-1.52506711E-02	5.43187266E-02	-3.38304633E-03	1.16880687E-02	8.55318683E-03	-2.95400203E-02
12	-11	-2.62917539E-02	9.55831131E-02	1.02580352E-03	4.09961357E-05	-3.50152909E-03	2.07692808E-03
12	-12	-3.72776720E-03	1.60634916E-02	5.82061141E-03	-2.40293415E-02	-1.70533830E-02	7.04581208E-02
13	13	-2.37982443E-03	1.94553051E-02	3.11216511E-03	-2.32790623E-02	9.91317750E-03	-7.42776469E-02
13	12	-1.52050771E-02	9.33705139E-02	3.40777951E-04	3.01418639E-03	1.40306647E-03	7.16239221E-03
13	11	-8.47075744E-03	5.08828967E-02	-1.67259381E-03	9.62191041E-03	-4.64421110E-03	2.67048472E-02
13	10	-5.71152866E-03	3.46965701E-02	-6.88665739E-04	4.10942874E-03	-1.72968514E-03	1.03199772E-02
13	9	-4.40961260E-03	2.68824055E-02	-4.37916073E-04	2.64354961E-03	-9.88367581E-04	5.96597701E-03
13	8	-3.60689733E-03	2.20219343E-02	-3.25424985E-04	1.97579521E-03	-6.52372674E-04	3.96063362E-03
13	7	-3.05762254E-03	1.86812756E-02	-2.63066930E-04	1.60257641E-03	-4.61255474E-04	2.80981791E-03
13	6	-2.66227705E-03	1.62702707E-02	-2.24440739E-04	1.37021537E-03	-3.37239926E-04	2.05880126E-03
13	5	-2.37139376E-03	1.44931720E-02	-1.98987432E-04	1.21657840E-03	-2.49140101E-04	1.52317358E-03
13	4	-2.15730557E-03	1.31836639E-02	-1.81720132E-04	1.11210912E-03	-1.82014008E-04	1.11389114E-03
13	3	-2.00343382E-03	1.22417056E-02	-1.70025667E-04	1.04124164E-03	-1.27728500E-04	7.82204177E-04
13	2	-1.89954413E-03	1.16053736E-02	-1.62451508E-04	9.95292673E-04	-8.13619251E-05	4.98476564E-04
13	1	-1.83943247E-03	1.12370608E-02	-1.58183254E-04	9.69381543E-04	-3.96132471E-05	2.42757056E-04
13	0	-1.81974877E-03	1.11164365E-02	-1.56803425E-04	9.61002342E-04	0.	0.
13	-1	-1.83943247E-03	1.12370608E-02	-1.58183254E-04	9.69381543E-04	3.96132471E-05	-2.42757056E-04
13	-2	-1.89954413E-03	1.16053736E-02	-1.62451508E-04	9.95292673E-04	8.13619251E-05	-4.98476564E-04
13	-3	-2.00343382E-03	1.22417056E-02	-1.70025667E-04	1.04124164E-03	1.27728500E-04	-7.82204177E-04
13	-4	-2.15730557E-03	1.31836639E-02	-1.81720132E-04	1.11210912E-03	1.82014008E-04	-1.11389114E-03
13	-5	-2.37139376E-03	1.44931720E-02	-1.98987432E-04	1.21657840E-03	2.49140101E-04	-1.52317358E-03
13	-6	-2.66227705E-03	1.62702707E-02	-2.24440739E-04	1.37021537E-03	3.37239926E-04	-2.05880126E-03
13	-7	-3.05762254E-03	1.86812756E-02	-2.63066930E-04	1.60257641E-03	4.61255474E-04	-2.80981791E-03
13	-8	-3.60689733E-03	2.20219343E-02	-3.25424985E-04	1.97579521E-03	6.52372674E-04	-3.96063362E-03
13	-9	-4.40961260E-03	2.68824055E-02	-4.37916073E-04	2.64354961E-03	9.88367581E-04	-5.96597701E-03
13	-10	-5.71152866E-03	3.46965701E-02	-6.88665739E-04	4.10942874E-03	1.72968514E-03	-1.03199772E-02
13	-11	-8.47075744E-03	5.08828967E-02	-1.67259381E-03	9.62191041E-03	4.64421110E-03	-2.67048472E-02
13	-12	-1.52050771E-02	9.33705139E-02	3.40777951E-04	3.01418639E-03	-1.40306647E-03	-7.16239221E-03
13	-13	-2.37982443E-03	1.94553051E-02	3.11216511E-03	-2.32790623E-02	-9.91317750E-03	7.42776469E-02
14	14	-3.37797820E-04	2.21734002E-02	6.13399072E-04	-2.21130237E-02	2.09519971E-03	-7.62485125E-02
14	13	-4.88029980E-03	9.00444575E-02	4.24329426E-04	4.79966496E-03	1.53358715E-03	1.40154796E-02
14	12	-2.67813939E-03	4.75269637E-02	-5.08248412E-04	8.08657408E-03	-1.53853599E-03	2.44548289E-02
14	11	-1.76752479E-03	3.23150690E-02	-2.05463417E-04	5.58583402E-03	-5.67491190E-04	9.90055402E-03
14	10	-1.34114504E-03	2.47538405E-02	-1.28969852E-04	2.32330469E-03	-3.23336994E-04	5.82348819E-03
14	9	-1.07828293E-03	1.99791133E-02	-9.49001168E-05	1.73739101E-03	-2.13963810E-04	3.91659915E-03
14	8	-8.97576116E-04	1.66547183E-02	-7.60369332E-05	1.40549463E-03	-1.52321872E-04	2.81527909E-03
14	7	-7.66319627E-04	1.42210380E-02	-6.43051829E-05	1.19606537E-03	-1.12693768E-04	2.09592267E-03
14	6	-6.68289510E-04	1.23939742E-02	-5.64950716E-05	1.05526558E-03	-8.48566207E-05	1.58493940E-03
14	5	-5.94379382E-04	1.10115304E-02	-5.10936127E-05	9.57210891E-04	-6.39538869E-05	1.19809510E-03
14	4	-5.39068248E-04	9.97437849E-03	-4.73045206E-05	8.88083239E-04	-4.73719298E-05	8.89327316E-04
14	3	-4.98856938E-04	9.21954634E-03	-4.46777593E-05	8.39990809E-04	-3.35588745E-05	6.30935449E-04

SAMPLE CASE --- TWO AR=2 SURF
ORIZONTAL AND VERTICAL SEPARATIONS

AIC CALCULATIONS

MACH = 1.20000 K1 = .0331662 ERR = 1.00000E-02 EL = 0.00 YBAR = 0.00

NU	MU	C VELOCITY POTENTIAL COEFFICIENT		W UPWASH COEFFICIENT		V SIDEWASH COEFFICIENT	
0	0	-4.99669441E-01	1.35612131E-02	0.	0.	0.	0.
1	0	-3.83780888E-01	3.72653793E-02	0.	0.	0.	0.
1	-1	-3.02537716E-01	3.51774045E-02	0.	0.	0.	0.
2	0	-1.58274582E-01	3.41050490E-02	0.	0.	0.	0.
2	-1	-1.98775746E-01	4.21384433E-02	0.	0.	0.	0.
2	-2	-2.06053452E-01	4.75173856E-02	0.	0.	0.	0.
3	0	-9.83703960E-02	3.28543730E-02	0.	0.	0.	0.
3	-1	-1.05489007E-01	3.51833148E-02	0.	0.	0.	0.
3	-2	-1.47785247E-01	4.86337200E-02	0.	0.	0.	0.
3	-3	-1.62295376E-01	5.66261105E-02	0.	0.	0.	0.
4	0	-6.81525261E-02	3.13856404E-02	0.	0.	0.	0.
4	-1	-7.08290748E-02	3.26038898E-02	0.	0.	0.	0.
4	-2	-8.09774972E-02	3.72153085E-02	0.	0.	0.	0.
4	-3	-1.18703126E-01	5.39547333E-02	0.	0.	0.	0.
4	-4	-1.34046042E-01	6.38424648E-02	0.	0.	0.	0.
5	0	-4.93500601E-02	2.96149940E-02	0.	0.	0.	0.
5	-1	-5.06323716E-02	3.03790933E-02	0.	0.	0.	0.
5	-2	-5.50235203E-02	3.29920612E-02	0.	0.	0.	0.
5	-3	-6.50871190E-02	3.89671498E-02	0.	0.	0.	0.
5	-4	-9.81522509E-02	5.81981438E-02	0.	0.	0.	0.
5	-5	-1.12751838E-01	6.96207609E-02	0.	0.	0.	0.
6	0	-3.63050688E-02	2.75563287E-02	0.	0.	0.	0.
6	-1	-3.70060878E-02	2.80858986E-02	0.	0.	0.	0.
6	-2	-3.92959019E-02	2.98145968E-02	0.	0.	0.	0.
6	-3	-4.39152690E-02	3.32964611E-02	0.	0.	0.	0.
6	-4	-5.31898899E-02	4.02714174E-02	0.	0.	0.	0.
6	-5	-8.19406102E-02	6.14878343E-02	0.	0.	0.	0.
6	-6	-9.52385406E-02	7.41890253E-02	0.	0.	0.	0.
7	0	-2.66803249E-02	2.52527061E-02	0.	0.	0.	0.
7	-1	-2.79944006E-02	2.56432429E-02	0.	0.	0.	0.
7	-2	-2.84124874E-02	2.68859576E-02	0.	0.	0.	0.

7	-3	-3.09101106E-02	2.92388864E-02	0.	0.	0.	0.
7	-4	-3.52822140E-02	3.33509956E-02	0.	0.	0.	0.
7	-5	-4.35481149E-02	4.11045928E-02	0.	0.	0.	0.
7	-6	-6.82881173E-02	6.39065410E-02	0.	0.	0.	0.
7	-7	-8.00574122E-02	7.76904920E-02	0.	0.	0.	0.
8	0	-1.93534078E-02	2.27776282E-02	0.	0.	0.	0.
8	-1	-1.96065790E-02	2.30748510E-02	0.	0.	0.	0.
8	-2	-2.04006206E-02	2.40068433E-02	0.	0.	0.	0.
8	-3	-2.18546126E-02	2.57125717E-02	0.	0.	0.	0.
8	-4	-2.42349520E-02	2.85024106E-02	0.	0.	0.	0.
8	-5	-2.81504160E-02	3.30834487E-02	0.	0.	0.	0.
8	-6	-3.53149521E-02	4.14460143E-02	0.	0.	0.	0.
8	-7	-5.63226441E-02	6.55224972E-02	0.	0.	0.	0.
8	-8	-6.64812250E-02	8.02511141E-02	0.	0.	0.	0.
9	0	-1.36536158E-02	2.01395719E-02	0.	0.	0.	0.
9	-1	-1.38130848E-02	2.03743775E-02	0.	0.	0.	0.
9	-2	-1.43081589E-02	2.11032178E-02	0.	0.	0.	0.
9	-3	-1.51944494E-02	2.24075396E-02	0.	0.	0.	0.
9	-4	-1.65876175E-02	2.44565463E-02	0.	0.	0.	0.
9	-5	-1.87192445E-02	2.75883532E-02	0.	0.	0.	0.
9	-6	-2.20996834E-02	3.25455499E-02	0.	0.	0.	0.
9	-7	-2.81468341E-02	4.13902112E-02	0.	0.	0.	0.
9	-8	-4.55880825E-02	6.64147609E-02	0.	0.	0.	0.
9	-9	-5.40196170E-02	8.18676526E-02	0.	0.	0.	0.
10	0	-9.22935494E-03	1.74162743E-02	0.	0.	0.	0.
10	-1	-9.32978337E-03	1.76055805E-02	0.	0.	0.	0.
10	-2	-9.63939934E-03	1.81891284E-02	0.	0.	0.	0.
10	-3	-1.01853736E-02	1.92178725E-02	0.	0.	0.	0.
10	-4	-1.10215237E-02	2.07926504E-02	0.	0.	0.	0.
10	-5	-1.22469657E-02	2.30989010E-02	0.	0.	0.	0.
10	-6	-1.40517571E-02	2.64913718E-02	0.	0.	0.	0.
10	-7	-1.68462984E-02	3.17353784E-02	0.	0.	0.	0.
10	-8	-2.17694763E-02	4.09392936E-02	0.	0.	0.	0.
10	-9	-3.57973860E-02	6.66196905E-02	0.	0.	0.	0.
10	-10	-4.24590939E-02	8.26216243E-02	0.	0.	0.	0.
11	0	-5.83916779E-03	1.46664657E-02	0.	0.	0.	0.
11	-1	-5.90078868E-03	1.48212020E-02	0.	0.	0.	0.
11	-2	-6.08983020E-03	1.52956524E-02	0.	0.	0.	0.
11	-3	-6.41970067E-03	1.61239079E-02	0.	0.	0.	0.
11	-4	-6.91605609E-03	1.73694020E-02	0.	0.	0.	0.
11	-5	-7.62351803E-03	1.91435636E-02	0.	0.	0.	0.
11	-6	-8.62033143E-03	2.16410619E-02	0.	0.	0.	0.
11	-7	-1.00533793E-02	2.52262670E-02	0.	0.	0.	0.
11	-8	-1.22367151E-02	3.06771025E-02	0.	0.	0.	0.

11	-9	-1.60386098E-02	4.01251198E-02	0.	0.	0.	0.
11	-10	-2.67874470E-02	6.61820553E-02	0.	0.	0.	0.
11	-11	-3.16568299E-02	8.25593435E-02	0.	0.	0.	0.
12	0	-3.31410387E-03	1.19482052E-02	0.	0.	0.	0.
12	-1	-3.34944725E-03	1.20757813E-02	0.	0.	0.	0.
12	-2	-3.45748920E-03	1.24657298E-02	0.	0.	0.	0.
12	-3	-3.64460663E-03	1.31409284E-02	0.	0.	0.	0.
12	-4	-3.92269497E-03	1.41440199E-02	0.	0.	0.	0.
12	-5	-4.31160686E-03	1.55460838E-02	0.	0.	0.	0.
12	-6	-4.84400056E-03	1.74640442E-02	0.	0.	0.	0.
12	-7	-5.57591213E-03	2.00974176E-02	0.	0.	0.	0.
12	-8	-6.61109057E-03	2.38148893E-02	0.	0.	0.	0.
12	-9	-8.17079482E-03	2.93981421E-02	0.	0.	0.	0.
12	-10	-1.08640675E-02	3.89711497E-02	0.	0.	0.	0.
12	-11	-1.84600241E-02	6.51450574E-02	0.	0.	0.	0.
12	-12	-2.15311213E-02	8.17247372E-02	0.	0.	0.	0.
13	0	-1.52635071E-03	9.31724946E-03	0.	0.	0.	0.
13	-1	-1.54357226E-03	9.42290476E-03	0.	0.	0.	0.
13	-2	-1.59608036E-03	9.74500408E-03	0.	0.	0.	0.
13	-3	-1.68652388E-03	1.02996621E-02	0.	0.	0.	0.
13	-4	-1.81975013E-03	1.11163399E-02	0.	0.	0.	0.
13	-5	-2.00360435E-03	1.22426482E-02	0.	0.	0.	0.
13	-6	-2.25044534E-03	1.37534277E-02	0.	0.	0.	0.
13	-7	-2.58009258E-03	1.57683366E-02	0.	0.	0.	0.
13	-8	-3.02600089E-03	1.84885050E-02	0.	0.	0.	0.
13	-9	-3.64983931E-03	2.22824510E-02	0.	0.	0.	0.
13	-10	-4.58288633E-03	2.79275002E-02	0.	0.	0.	0.
13	-11	-6.18762208E-03	3.75285221E-02	0.	0.	0.	0.
13	-12	-1.07562881E-02	6.35516015E-02	0.	0.	0.	0.
13	-13	-1.20383237E-02	8.01615653E-02	0.	0.	0.	0.
14	0	-3.71815945E-04	6.82555445E-03	0.	0.	0.	0.
14	-1	-3.76456183E-04	6.91313772E-03	0.	0.	0.	0.
14	-2	-3.90578748E-04	7.17962086E-03	0.	0.	0.	0.
14	-3	-4.14813348E-04	7.63663801E-03	0.	0.	0.	0.
14	-4	-4.50296488E-04	8.30514014E-03	0.	0.	0.	0.
14	-5	-4.98827722E-04	9.21818616E-03	0.	0.	0.	0.
14	-6	-5.63153510E-04	1.04259810E-02	0.	0.	0.	0.
14	-7	-6.47487118E-04	1.20050222E-02	0.	0.	0.	0.
14	-8	-7.58511667E-04	1.40755424E-02	0.	0.	0.	0.
14	-9	-9.07489381E-04	1.68376250E-02	0.	0.	0.	0.
14	-10	-1.11529580E-03	2.06556064E-02	0.	0.	0.	0.
14	-11	-1.42697726E-03	2.62948520E-02	0.	0.	0.	0.
14	-12	-1.97041278E-03	3.58216463E-02	0.	0.	0.	0.
14	-13	-3.61572184E-03	6.14451136E-02	0.	0.	0.	0.

14	-14	-3.18510175E-03	7.79147557E-02	0.	0.	0.	0.
15	0	2.39857385E-04	4.51992878E-03	0.	0.	0.	0.
15	-1	2.43895493E-04	4.59237037E-03	0.	0.	0.	0.
15	-2	2.56161447E-04	4.81246030E-03	0.	0.	0.	0.
15	-3	2.77124615E-04	5.18876549E-03	0.	0.	0.	0.
15	-4	3.07618702E-04	5.73652946E-03	0.	0.	0.	0.
15	-5	3.48931101E-04	6.47935636E-03	0.	0.	0.	0.
15	-6	4.02957604E-04	7.[illegible]5214217E-03	0.	0.	0.	0.
15	-7	4.72467458E-04	8.70613507E-03	0.	0.	0.	0.
15	-8	5.61571159E-04	1.03179566E-02	0.	0.	0.	0.
15	-9	6.76593686E-04	1.24066678E-02	0.	0.	0.	0.
15	-10	8.27843443E-04	1.51689736E-02	0.	0.	0.	0.
15	-11	1.03363264E-03	1.89613281E-02	0.	0.	0.	0.
15	-12	1.33109416E-03	2.45299598E-02	0.	0.	0.	0.
15	-13	1.81457923E-03	3.38840698E-02	0.	0.	0.	0.
15	-14	2.90106485E-03	5.88699629E-02	0.	0.	0.	0.
15	-15	5.11245065E-03	7.5031184GE-02	0.	0.	0.	0.
16	0	3.90947265E-04	2.44086871E-03	0.	0.	0.	0.
16	-1	4.00828484E-04	2.50047643E-03	0.	0.	0.	0.
16	-2	4.30815044E-04	2.68137753E-03	0.	0.	0.	0.
16	-3	4.81964054E-04	2.98997947E-03	0.	0.	0.	0.
16	-4	5.56137462E-04	3.43757361E-03	0.	0.	0.	0.
16	-5	6.56173024E-04	4.04138196E-03	0.	0.	0.	0.
16	-6	7.86172918E-04	4.82632687E-03	0.	0.	0.	0.
16	-7	9.51981429E-04	5.82796599E-03	0.	0.	0.	0.
16	-8	1.161[illegible]60E-03	7.09745539E-03	0.	0.	0.	0.
16	-9	1.4[illegible]855805E-03	8.71031390E-03	0.	0.	0.	0.
16	-10	1.7[illegible]56494E-03	1.0782927GE-02	0.	0.	0.	0.
16	-11	2.21935250E-03	1.35065064E-02	0.	0.	0.	0.
16	-12	2.83027494E-03	1.72261705E-02	0.	0.	0.	0.
16	-13	3.71836382E-03	2.26622385E-02	0.	0.	0.	0.
16	-14	5.18722403E-03	3.17493629E-02	0.	0.	0.	0.
16	-15	8.88566854E-03	5.58716323E-02	0.	0.	0.	0.
16	-16	1.26955900E-02	7.15600868E-02	0.	0.	0.	0.
17	0	1.58787530E-04	6.21604294E-04	0.	0.	0.	0.
17	-1	1.72400938E-04	6.70254190E-04	0.	0.	0.	0.
17	-2	2.13682004E-04	8.17782706E-04	0.	0.	0.	0.
17	-3	2.83984684E-04	1.06903946E-03	0.	0.	0.	0.
17	-4	3.85675563E-04	1.43250587E-03	0.	0.	0.	0.
17	-5	5.22318763E-04	1.92094629E-03	0.	0.	0.	0.
17	-6	6.98980929E-04	2.55254234E-03	0.	0.	0.	0.
17	-7	9.22720363E-04	3.35261876E-03	0.	0.	0.	0.
17	-8	1.20337875E-03	4.35652728E-03	0.	0.	0.	0.
17	-9	1.55490318E-03	5.61442762E-03	0.	0.	0.	0.

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
WING UPPER SURFACE NORMAL WASH
(MACH 1.200 , RED. FREQ.= .50000)
MODE SHAPE 2

ROW	CHORD 1		CHORD 2		CHORD 3		CHORD 4	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
1	6.63324958E-02	1.10000000E-03	6.63324958E-02	1.10000000E-03	6.63324958E-02	1.10000000E-03	6.63324958E-02	1.10000000E-03
2	6.63324958E-02	3.30000000E-03	6.63324958E-02	3.30000000E-03	6.63324958E-02	3.30000000E-03	6.63324958E-02	3.30000000E-03
3	6.63324958E-02	5.50000000E-03	6.63324958E-02	5.50000000E-03	6.63324958E-02	5.50000000E-03	6.63324958E-02	5.50000000E-03
4	6.63324958E-02	7.70000000E-03	6.63324958E-02	7.70000000E-03	6.63324958E-02	7.70000000E-03	6.63324958E-02	7.70000000E-03
5	6.63324958E-02	9.90000000E-03	6.63324958E-02	9.90000000E-03	6.63324958E-02	9.90000000E-03	6.63324958E-02	9.90000000E-03
6	6.63324958E-02	1.21000000E-02	6.63324958E-02	1.21000000E-02	6.63324958E-02	1.21000000E-02	6.63324958E-02	1.21000000E-02
7	6.63324958E-02	1.43000000E-02	6.63324958E-02	1.43000000E-02	6.63324958E-02	1.43000000E-02	6.63324958E-02	1.43000000E-02
8	6.63324958E-02	1.65000000E-02	6.63324958E-02	1.65000000E-02	6.63324958E-02	1.65000000E-02	6.63324958E-02	1.65000000E-02
9	6.63324958E-02	1.87000000E-02	6.63324958E-02	1.87000000E-02	6.63324958E-02	1.87000000E-02	6.63324958E-02	1.87000000E-02
10	6.63324958E-02	2.09000000E-02	6.63324958E-02	2.09000000E-02	6.63324958E-02	2.09000000E-02	6.63324958E-02	2.09000000E-02
11	6.63324958E-02	2.31000000E-02	6.63324958E-02	2.31000000E-02	6.63324958E-02	2.31000000E-02	6.63324958E-02	2.31000000E-02
12	6.63324958E-02	2.53000000E-02	6.63324958E-02	2.53000000E-02	6.63324958E-02	2.53000000E-02	6.63324958E-02	2.53000000E-02
13	6.63324958E-02	2.75000000E-02	6.63324958E-02	2.75000000E-02	6.63324958E-02	2.75000000E-02	6.63324958E-02	2.75000000E-02
14	6.63324958E-02	2.97000000E-02	6.63324958E-02	2.97000000E-02	6.63324958E-02	2.97000000E-02	6.63324958E-02	2.97000000E-02
15	6.63324958E-02	3.19000000E-02	6.63324958E-02	3.19000000E-02	6.63324958E-02	3.19000000E-02	6.63324958E-02	3.19000000E-02
16	4.89641580E-02	-1.30749482E-02	4.93038417E-02	-1.22854610E-02	5.00166418E-02	-1.10011154E-02	5.13430376E-02	-1.08606884E-02
17	5.34033895E-02	-1.25650430E-02	5.35634354E-02	-1.14413488E-02	5.38681729E-02	-8.06011302E-03	5.40440732E-02	-9.10496770E-03
18	5.41381779E-02	-2.02172665E-02	5.43168889E-02	-1.95243635E-02	5.44424617E-02	-1.89244049E-02	5.46292480E-02	-2.12867906E-02
19	5.79542051E-02	-1.96828640E-02	5.78454023E-02	-1.88978027E-02	5.76530897E-02	-1.69356306E-02	5.69733825E-02	-1.89264435E-02
20	5.73734614E-02	-2.71512149E-02	5.71352697E-02	-2.71388378E-02	5.68186521E-02	-2.65568648E-02	5.62169272E-02	-2.88472801E-02
21	6.04595963E-02	-2.70321600E-02	6.02605942E-02	-2.62106415E-02	5.97677831E-02	-2.45199788E-02	5.84133933E-02	-2.65929915E-02
22	5.85434725E-02	-3.42361761E-02	5.82811655E-02	-3.39618414E-02	5.77905313E-02	-3.30531375E-02	5.65157681E-02	-3.52168190E-02
23	6.11982717E-02	-3.39216002E-02	6.09598075E-02	-3.30474671E-02	6.03843690E-02	-3.12862399E-02	5.84167806E-02	-3.33057775E-02
24	5.82471648E-02	-4.04904736E-02	5.78703147E-02	-4.01406143E-02	5.71449832E-02	-3.90809117E-02	5.53246249E-02	-4.10897404E-02
25	6.05806479E-02	-4.00119142E-02	6.01789947E-02	-3.92066531E-02	5.93362001E-02	-3.75892667E-02	5.69321679E-02	-3.95670355E-02
26	5.66229702E-02	-4.59595304E-02	5.60746600E-02	-4.56029133E-02	5.52333135E-02	-4.44969255E-02	5.30926973E-02	-4.64212[illegible]E-02
27	5.85342587E-02	-4.54480721E-02	5.81445607E-02	-4.47221836E-02	5.73011295E-02	-4.31999606E-02	5.46365432E-02	-4.51101685E-02
28	5.37129457E-02	-5.07683932E-02	5.32926932E-02	-5.03777030E-02	5.25696855E-02	-4.92341998E-02	5.02389327E-02	-5.10742794E-02
29	5.55032601E-02	-5.02873669E-02	5.51823218E-02	-4.96013106E-02	5.44977244E-02	-4.81416667E-02	5.17346519E-02	-4.99633399E-02

ROW	CHORD 5		CHORD 6		CHORD 7		CHORD 8	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
1	6.63324958E-02	1.10000000E-03	6.63324958E-02	1.10000000E-03	6.63324958E-02	1.10000000E-03	6.63324958E-02	1.10000000E-03
2	6.63324958E-02	3.30000000E-03	6.63324958E-02	3.30000000E-03	6.63324958E-02	3.30000000E-03	6.63324958E-02	3.30000000E-03
3	6.63324958E-02	5.50000000E-03	6.63324958E-02	5.50000000E-03	6.63324958E-02	5.50000000E-03	6.63324958E-02	5.50000000E-03
4	6.63324958E-02	7.70000000E-03	6.63324958E-02	7.70000000E-03	6.63324958E-02	7.70000000E-03	6.63324958E-02	7.70000000E-03

5	6.63324958E-02	9.90000000E-03	6.63324958E-02	9.90000000E-03	6.63324958E-02	9.90000000E-03	6.63324958E-02	9.90000000
6	6.63324958E-02	1.21000000E-02	6.63324958E-02	1.21000000E-02	6.63324958E-02	1.21000000E-02	6.63324958E-02	1.21000000
7	6.63324958E-02	1.43000000E-02	6.63324958E-02	1.43000000E-02	6.63324958E-02	1.43000000E-02	6.63324958E-02	1.43000000
8	6.63324958E-02	1.65000000E-02	6.63324958E-02	1.65000000E-02	6.63324958E-02	1.65000000E-02	6.63324958E-02	1.65000000
9	6.63324958E-02	1.87000000E-02	6.63324958E-02	1.87000000E-02	6.63324958E-02	1.87000000E-02	6.63324958E-02	1.87000000
10	6.63324958E-02	2.09000000E-02	6.63324958E-02	2.09000000E-02	6.63324958E-02	2.09000000E-02	6.63324958E-02	2.09000000
11	6.63324958E-02	2.31000000E-02	6.63324958E-02	2.31000000E-02	6.63324958E-02	2.31000000E-02	6.63324958E-02	2.31000000
12	6.63324958E-02	2.53000000E-02	6.63324958E-02	2.53000000E-02	6.63324958E-02	2.53000000E-02	6.63324958E-02	2.53000000
13	6.63324958E-02	2.75000000E-02	6.63324958E-02	2.75000000E-02	6.63324958E-02	2.75000000E-02	6.63324958E-02	2.75000000
14	6.63324958E-02	2.97000000E-02	6.63324958E-02	2.97000000E-02	6.63324958E-02	2.97000000E-02	6.63324958E-02	2.97000000
15	6.63324958E-02	3.19000000E-02	6.63324958E-02	3.19000000E-02	6.63324958E-02	3.19000000E-02	6.63324958E-02	3.19000000

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
WING UPPER SURFACE NORMAL WASH
(MACH 1.200 RED. FREQ.= .50000)
MODE SHAPE 2

PAGE CONTINUED

ROW	CHORD 5		CHORD 6		CHORD 7		CHORD 8	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
16	5.30176346E-02	-9.91932790E-04	5.50613145E-02	1.04159983E-02	5.69535875E-02	1.23276743E-02	5.88563377E-02	1.49505673E-02
17	5.43792077E-02	-5.14658827E-03	5.64545688E-02	6.87301296E-03	5.88168279E-02	1.24604221E-02	6.05004023E-02	1.52164635E-02
18	5.55270913E-02	-1.44806783E-02	5.75290193E-02	-1.04166120E-03	5.99711433E-02	7.29512421E-03	6.20595209E-02	1.32708146E-02
19	5.67210504E-02	-1.47246991E-02	5.82665656E-02	-3.40550016E-03	6.00788565E-02	3.32387786E-03	6.20850019E-02	1.00460554E-02
20	5.66753455E-02	-2.26377513E-02	5.86437178E-02	-9.53426289E-03	6.01737174E-02	-1.99920037E-03	6.14715913E-02	4.29761481E-03
21	5.77773679E-02	-2.21106111E-02	5.90086164E-02	-1.10086512E-02	5.99448603E-02	-4.79230965E-03	6.10546534E-02	1.06655474E-03
22	5.65311153E-02	-2.93813307E-02	5.83963492E-02	-1.68161852E-02	5.9527644 [illegible]-02	-9.65812058E-03	6.05020749E-02	-3.49853951E-03
23	5.73788943E-02	-2.87875354E-02	5.86483818E-02	-1.78121969E-02	5.93340972E-02	-1.17494930E-02	6.01316867E-02	-6.13287008E-03
24	5.52344872E-02	-3.54524593E-02	5.74448841E-02	-2.32323246E-02	5.85694276E-02	-1.62468669E-02	5.94703856E-02	-1.01681791E-02
25	5.60419323E-02	-3.48533143E-02	5.77589677E-02	-2.36914847E-02	5.84255983E-02	-1.79039209E-02	5.91504993E-02	-1.23946730E-02
26	5.31226009E-02	-4.09267681E-02	5.59590667E-02	-2.89583669E-02	5.73136244E-02	-2.20966980E-02	5.82993476E-02	-1.60938672E-02
27	5.39440323E-02	-4.03352086E-02	5.62390469E-02	-2.94608082E-02	5.71513511E-02	-2.34842761E-02	5.80062583E-02	-1.80323749E-02
28	5.04753262E-02	-4.37299853E-02	5.39317467E-02	-3.41047884E-02	5.55869660E-02	-2.74147080E-02	5.68689856E-02	-2.14771115E-02
29	5.13339490E-02	-4.31762087E-02	5.42664754E-02	-3.44715660E-02	5.54375842E-02	-2.85786082E-02	5.64938414E-02	-2.32117324E-02

ROW	CHORD 9		CHORD 10		CHORD 11		CHORD 12	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
1	6.63324958E-02	1.10000000E-03	6.63324958E-02	1.10000000E-03	0.	0.	0.	0.
2	6.63324958E-02	3.30000000E-03	6.63324958E-02	3.30000000E-03	-4.03191249E-02	2.90959820E-03	0.	0.
3	6.63324958E-02	5.50000000E-03	6.63324958E-02	5.50000000E-03	-6.37650304E-02	6.71026764E-03	-3.28298178E-03	1.16513312E-03
4	6.63324958E-02	7.70000000E-03	6.63324958E-02	7.70000000E-03	-8.77160363E-02	1.13970809E-02	-1.27975218E-02	3.64123429E-03
5	6.63324958E-02	9.90000000E-03	6.63324958E-02	9.90000000E-03	-1.03366260E-01	1.57205476E-02	-1.65889770E-02	5.53256845E-03
6	6.63324958E-02	1.21000000E-02	6.63324958E-02	1.21000000E-02	-1.20361173E-01	2.09651249E-02	-2.42536793E-02	8.65275973E-03
7	6.63324958E-02	1.43000000E-02	6.63324958E-02	1.43000000E-02	-1.31800755E-01	2.52582849E-02	-2.72308740E-02	1.06907871E-02
8	6.63324958E-02	1.65000000E-02	6.63324958E-02	1.65000000E-02	-1.44199558E-01	3.02989260E-02	-3.31316394E-02	1.39589871E-02
9	6.63324958E-02	1.87000000E-02	6.63324958E-02	1.87000000E-02	-1.52601945E-01	3.40551597E-02	-3.53058470E-02	1.58599667E-02
10	6.63324958E-02	2.09000000E-02	6.63324958E-02	2.09000000E-02	-1.61611196E-01	3.83100086E-02	-3.97414186E-02	1.89511006E-02
11	6.63324958E-02	2.31000000E-02	6.63324958E-02	2.31000000E-02	-1.67686671E-01	4.10811266E-02	-4.12400257E-02	2.05096602E-02
12	6.63324958E-02	2.53000000E-02	6.63324958E-02	2.53000000E-02	-1.74174867E-01	4.41086530E-02	-4.45073661E-02	2.31806971E-02
13	6.63324958E-02	2.75000000E-02	6.63324958E-02	2.75000000E-02	-1.78535748E-01	4.55466611E-02	-4.54944213E-02	2.42402706E-02
14	6.63324958E-02	2.97000000E-02	6.63324958E-02	2.97000000E-02	-1.83251245E-01	4.70548004E-02	-4.78900387E-02	2.63266740E-02
15	6.63324958E-02	3.19000000E-02	6.63324958E-02	3.19000000E-02	-1.86493052E-01	4.69535457E-02	-4.85573078E-02	2.67945501E-02
16	6.09179906E-02	1.84679076E-02	6.31184786E-02	2.39654324E-02	-1.90119958E-01	4.68089760E-02	-5.03699424E-02	2.82128903E-02
17	6.21204447E-02	1.85005614E-02	6.33756342E-02	2.26240652E-02	-1.90328165E-01	5.10933937E-02	-5.09283631E-02	2.80540906E-02
18	6.30009000E-02	1.64886655E-02	6.33470944E-02	2.00508602E-02	-1.90092157E-01	5.66633914E-02	-5.20633292E-02	2.92203809E-02
19	6.34150301E-02	1.47885497E-02	6.37564871E-02	1.80803960E-02	-1.88250356E-01	6.30070751E-02	-5.14282272E-02	3.03414323E-02

20	6.30432416E-02	1.03561105E-02	6.39999152E-02	1.56041868E-02	-1.86882715E-01	6.90765780E-02	-5.14090667E-02	3.22391763E-02
21	6.21532667E-02	6.29835288E-03	6.36310965E-02	1.21088638E-02	-1.84303575E-01	7.50734456E-02	-5.02526410E-02	3.34852678E-02
22	6.14992208E-02	2.07468036E-03	6.24588453E-02	7.77605235E-03	-1.83175413E-01	7.98877033E-02	-4.97369900E-02	3.43360366E-02
23	6.09647776E-02	-9.99128631E-04	6.19944156E-02	4.46565443E-03	-1.81492997E-01	8.41865910E-02	-4.92946749E-02	3.55049950E-02
24	6.02810218E-02	-4.71283641E-03	6.11197429E-02	9.56613651E-04	-1.79884154E-01	8.90572969E-02	-4.98551290E-02	3.61484949E-02
25	5.98618112E-02	-7.32674558E-03	6.07745348E-02	-1.94795443E-03	-1.77350702E-01	9.36154949E-02	-4.93220213E-02	3.64861702E-02
26	5.91174265E-02	-1.06877451E-02	5.99687379E-02	-5.04681649E-03	-1.75067883E-01	9.88639838E-02	-4.92164213E-02	3.75344509E-02
27	5.87369932E-02	-1.30221590E-02	5.96653320E-02	-7.68608120E-03	-1.71938660E-01	1.03716705E-01	-4.83770563E-02	3.80963244E-02
28	5.78690969E-02	-1.61133529E-02	5.88382303E-02	-1.05127273E-02	-1.69066770E-01	1.08791922E-01	-4.78577853E-02	3.93204031E-02
29	5.74479102E-02	-1.82504756E-02	5.85207798E-02	-1.29608019E-02	-1.65445011E-01	1.13599786E-01	-4.67697855E-02	4.00044691E-02

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
WING UPPER SURFACE NORMAL WASH
(MACH 1.200 RED. FREQ.= .50000)
MODE SHAPE 2

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ROW	CHORD 13		CHORD 14		CHORD 15		CHORD 16	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
4	-3.44373466E-03	1.09582337E-03	0.	0.	0.	0.	0.	0.
5	-7.24405673E-03	2.76973082E-03	-1.94322794E-03	9.14503279E-04	0.	0.	0.	0.
6	-1.14863490E-02	4.75141796E-03	-4.66356705E-03	2.37317247E-03	-1.33621092E-03	8.05363569E-04	0.	0.
7	-1.44401398E-02	6.72365208E-03	-6.94868535E-03	3.93003987E-03	-3.12042302E-03	2.05351456E-03	-9.40314423E-04	7.17394071E-04
8	-1.81664905E-02	9.05484645E-03	-9.47261486E-03	5.78202322E-03	-4.80292119E-03	3.43996838E-03	-2.20337043E-03	1.81824070E-03
9	-2.02131926E-02	1.09509815E-02	-1.12706190E-02	7.47864451E-03	-6.39605141E-03	4.98731558E-03	-3.37792331E-03	3.03931286E-03
10	-2.32317936E-02	1.33351588E-02	-1.33298884E-02	9.41936548E-03	-7.82872197E-03	6.54581970E-03	-4.53058056E-03	4.41260790E-03
11	-2.45529999E-02	1.49535110E-02	-1.45765125E-02	1.10071844E-02	-9.00767772E-03	8.09634408E-03	-5.48306080E-03	5.75757718E-03
12	-2.68835747E-02	1.71581298E-02	-1.61628975E-02	1.28415526E-02	-1.01029280E-02	9.62019278E-03	-6.35119173E-03	7.14683044E-03
13	-2.76730137E-02	1.83620450E-02	-1.69400700E-02	1.41529826E-02	-1.08807889E-02	1.09959437E-02	-7.01319218E-03	8.42304855E-03
14	-2.94323537E-02	2.02243594E-02	-1.81283837E-02	1.57496171E-02	-1.16728875E-02	1.23521301E-02	-7.60542406E-03	9.68264618E-03
15	-2.96841840E-02	2.09355359E-02	-1.85712314E-02	1.66833163E-02	-1.21382507E-02	1.34415927E-02	-8.01383648E-03	1.07675525E-02
16	-3.12328537E-02	2.23541072E-02	-1.94720907E-02	1.79558435E-02	-1.27091411E-02	1.45444449E-02	-8.39943021E-03	1.18087750E-02
17	-3.15438555E-02	2.25455495E-02	-1.97418835E-02	1.84647869E-02	-1.29896767E-02	1.52873042E-02	-8.64480352E-03	1.26291324E-02
18	-3.26370046E-02	2.34817603E-02	-2.04616947E-02	1.93748727E-02	-1.34213285E-02	1.60961994E-02	-8.89608598E-03	1.34087037E-02
19	-3.26359469E-02	2.36484018E-02	-2.07060065E-02	1.94660691E-02	-1.36409376E-02	1.64825469E-02	-9.07545007E-03	1.39392964E-02
20	-3.28643249E-02	2.50550314E-02	-2.11489786E-02	2.02693319E-02	-1.40545680E-02	1.69978187E-02	-9.30568956E-03	1.44530753E-02
21	-3.22014537E-02	2.55990631E-02	-2.08702972E-02	2.05794628E-02	-1.41270885E-02	1.72172288E-02	-9.50493914E-03	1.47044550E-02
22	-3.19347106E-02	2.70052876E-02	-2.07607923E-02	2.15422036E-02	-1.41230280E-02	1.78460528E-02	-9.64058979E-03	1.50880083E-02
23	-3.10061574E-02	2.75224811E-02	-2.01832499E-02	2.18353212E-02	-1.38141988E-02	1.81072346E-02	-9.52991494E-03	1.53503958E-02
24	-3.14155437E-02	2.80695849E-02	-1.98079084E-02	2.27253158E-02	-1.35438422E-02	1.87063391E-02	-9.35848176E-03	1.57512644E-02
25	-3.17087588E-02	2.76185349E-02	-2.00256866E-02	2.23575239E-02	-1.30835002E-02	1.88705713E-02	-9.07006221E-03	1.59323004E-02
26	-3.19525492E-02	2.82438447E-02	-2.07941214E-02	2.24824962E-02	-1.35689011E-02	1.89658124E-02	-8.76404768E-03	1.62611932E-02
27	-3.17216688E-02	2.81994459E-02	-2.09429577E-02	2.22170399E-02	-1.42786537E-02	1.85661256E-02	0.	0.
28	-3.15969918E-02	2.89886994E-02	-2.11453359E-02	2.26414863E-02	0.	0.	0.	0.

ROW	CHORD 17		CHORD 18		CHORD 19		CHORD 20	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
8	-6.80367896E-04	6.46577963E-04	0.	0.	0.	0.	0.	0.
9	-1.56609326E-03	1.63111099E-03	-5.00370367E-04	5.90566475E-04	0.	0.	0.	0.
10	-2.43016860E-03	2.72071381E-03	-1.25025148E-03	1.47036362E-03	-3.58996464E-04	5.31856260E-04	0.	0.
11	-3.23873723E-03	3.93950114E-03	-1.75196522E-03	2.45469521E-03	-8.22442031E-04	1.32669563E-03	-2.56037860E-04	4.85044908E-04
12	-3.90668812E-03	5.13412743E-03	-2.31126880E-03	3.53736006E-03	-1.23591964E-03	2.20743583E-03	-5.74993281E-04	1.20117793E-03
13	-4.47822989E-03	6.34627040E-03	-2.75948579E-03	4.60117377E-03	-1.60958492E-03	3.17606585E-03	-8.47535685E-04	1.99452066E-03
14	-4.92596936E-03	7.48156522E-03	-3.12763024E-03	5.67425163E-03	-1.88873132E-03	4.12041401E-03	-1.07577483E-03	2.85952186E-03
15	-5.27247418E-03	8.55905455E-03	-3.39420425E-03	6.66791795E-03	-2.10191067E-03	5.06897526E-03	-1.22803278E-03	3.69967184E-03

16	-9.5582195CE-03	9.52779216E-03	-3.58969376E-03	7.61387747E-03	-2.23425180E-03	5.94108762E-03	-1.32058094E-03	[illegible]
17	-9.73293618E-03	1.03907450E-02	-3.72376222E-03	8.44787514E-03	-2.32040123E-03	6.76624043E-03	-1.36217350E-03	5.30244189E-03
18	-9.86996431E-03	1.11394753E-02	-3.78811879E-03	9.20303966E-03	-2.32893800E-03	7.48972831E-03	-1.32992370E-03	6.02023724E-03
19	-9.99549060E-03	1.17565379E-02	-3.85606277E-03	9.83573598E-03	-2.34520198E-03	8.14194768E-03	-1.30371396E-03	6.65024197E-03
20	-6.10941861E-03	1.22699081E-02	-3.88300303E-03	1.03769604E-02	-2.31181928E-03	8.68254021E-03	-1.22175705E-03	7.20615633E-03
21	-6.23629381E-03	1.26428171E-02	-3.94833883E-03	1.07999108E-02	-2.31551503E-03	9.14655378E-03	-1.17650478E-03	7.67500306E-03
22	-6.39589685E-03	1.29395270E-02	-4.01009098E-03	1.11378211E-02	-2.30565947E-03	9.50465000E-03	-1.10604250E-03	8.06202447E-03
23	-6.46741106E-03	1.31748323E-02	-4.13444493E-03	1.13768915E-02	-2.35486728E-03	9.79888686E-03	-1.09550927E-03	8.37857866E-03
24	-6.38760843E-03	1.34638455E-02	-4.17073026E-03	1.15987044E-02	-2.42197068E-03	1.00047719E-02	0.	0.
25	-6.23331690E-03	1.36528040E-02	0.	0.	0.	0.	0.	0.

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
WING UPPER SURFACE NORMAL WASH
(MACH 1.200 RED. FREQ.= .50000)
MODE SHAPE 2

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ROW	CHORD 21		CHORD 22		CHORD 23		CHORD 24	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
12	-1.74717044E-04	4.41134579E-04	0.	0.	0.	0.	0.	0.
13	-3.82337016E-04	1.06787407E-03	-1.10360272E-04	4.00858990E-04	0.	0.	0.	0.
14	-5.42869730E-04	1.80196221E-03	-2.29793159E-04	9.83831432E-04	-5.87005649E-05	3.63373162E-04	0.	0.
15	-6.59348084E-04	2.57422456E-03	-3.02209597E-04	1.62445034E-03	-1.07912734E-04	8.87690371E-04	-2.04470693E-05	3.28139270E-04
16	-7.10895882E-04	3.32035161E-03	-3.30188758E-04	2.31228605E-03	-1.07 120CE-04	1.46560629E-03	-1.287171C2E-05	7.97961850C-04
17	-7.21670133C-04	4.057753935-03	-3.13242567E-04	2.97201953C-03	-7.64634981E-05	2.07068664E-03	2.68935821E-05	1.30838854E-03
18	-6.90274902E-04	4.72743678E-03	-2.24045485E-04	3.61911566C-03	3.07807933E-05	2.65147306E-03	1.43172505E-04	1.84630316C-03
19	-5.95249172E-04	5.354C23C9E-03	-1.38063385E-04	4.20660277E-03	1.36125841E-04	3.22025310E-03	2.56141846C-04	2.35903839C-03
20	-4.775207C0E-04	5.89323467E-03	1.08203342E-05	4.74381945E-03	3.05080543E-04	3.72424214E-03	0.	0.
21	-3.48257274E-04	6.37C59695C-03	1.30843501E-04	5.21282666E-03	0.	0.	0.	0.
22	-2.72669739E-04	6.76716540E-03	0.	0.	0.	0.	0.	0.

ROW	CHORD 25		CHORD 26	
	REAL	IMAGINARY	REAL	IMAGINARY
16	2.11859982E-05	2.95121951E-04	0.	0.
17	6.25336508E-05	7.14094872E-04	3.34829454E-05	2.63851131E-04
18	1.82643667E-04	1.16460802E-03	0.	0.

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
TAIL UPPER SURFACE NORMAL WASH
(MACH 1.200 RED. FREQ.= .50000)
MODE SHAPE 2

ROW	CHORD 1		CHORD 2		CHORD 3		CHORD 4	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
19	-5.91117621E-02	-2.47284536E-02	-5.84920791E-02	-2.46367453E-02	-5.72504692E-02	-2.44095793E-02	-5.51534695E-02	-2.42748960E-02
20	-2.48461090E-02	7.62604131E-03	-2.40804922E-02	7.66129327E-03	-2.33310010E-02	5.95447091E-03	-2.6393979GE-02	2.21401863E-03
21	-3.06898118E-02	6.83011666E-03	-3.13032001E-02	4.88595339E-03	-3.08401114E-02	3.69555450E-03	-3.00202668E-02	2.03175787E-03
22	-2.96068597E-02	1.20060762E-02	-2.86532315E-02	1.26432369E-02	-2.85890768E-02	1.16241815E-02	-2.81264626E-02	9.75185104E-03
23	-3.39291788E-02	1.22802512E-02	-3.40362409E-02	1.10930708E-02	-3.32165604E-02	9.95689165E-03	-3.21064546E-02	8.10891405E-03
24	-3.11302725E-02	1.77250011E-02	-3.05313275E-02	1.76149357E-02	-3.01158143E-02	1.66364085E-02	-2.93183322E-02	1.47214772E-02
25	-3.33730719E-02	1.76619096E-02	-3.33764304E-02	1.66124153E-02	-3.45626225E-02	1.51083640E-02	-3.33954026E-02	1.29580866E-02
26	-3.18115445E-02	2.23868962E-02	-3.12358647E-02	2.19958548E-02	-3.03487004E-02	2.09051624E-02	-2.93686729E-02	1.88435648E-02
27	-3.36790652E-02	2.21230891E-02	-3.53209339E-02	2.11576834E-02	-3.42314106E-02	1.96584595E-02	-3.28952760E-02	1.75115528E-02
28	-3.11340922E-02	2.60897632E-02	-3.04566532E-02	2.56364876E-02	-2.94349385E-02	2.45211349E-02	-2.84291956E-02	2.24151502E-02
29	-3.45387728E-02	2.58209947E-02	-3.42202784E-02	2.49951715E-02	-3.31852087E-02	2.35320405E-02	-3.18147717E-02	2.13563401E-02
30	-2.93787437E-02	2.91053778E-02	-2.88783485E-02	2.85903589E-02	-2.79622851E-02	2.74651740E-02	-2.70761231E-02	2.53743520E-02
31	-3.26952241E-02	2.89805176E-02	-3.23820660E-02	2.81842294E-02	-3.15038605E-02	2.67441671E-02	-3.03207664E-02	2.45637878E-02
32	-2.72462488E-02	3.15949597E-02	-2.68237195E-02	3.10318318E-02	-2.60198742E-02	2.98457003E-02	-2.53350361E-02	2.77613574E-02
33	-3.05258394E-02	3.16924432E-02	-3.02489669E-02	3.09226013E-02	-2.94557784E-02	2.94746310E-02	-2.84195966E-02	2.72679793E-02

ROW	CHORD 5		CHORD 6		CHORD 7		CHORD 8	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
19	-5.21239318E-02	-2.39568863E-02	-4.79293884E-02	-2.34355827E-02	-4.23383163E-02	-2.26869769E-02	-3.4987789GE-02	-2.12205154E-02
20	-2.65862529E-02	-1.01561359E-03	-2.58952780E-02	-4.16937027E-03	-2.45644304E-02	-7.96759246E-03	-2.16729183E-02	-1.07745919E-02
21	-2.92213121E-02	-5.47973131E-04	-2.73445926E-02	-2.77955362E-03	-2.48483538E-02	-5.32290548E-03	-2.16808426E-02	-8.90976012E-03
22	-2.73426720E-02	7.10127731E-03	-2.67000506E-02	2.89845759E-03	-2.49032017E-02	-1.75247646E-03	-2.05845508E-02	-5.26908729E-03
23	-3.04962510E-02	5.80160599E-03	-2.80354560E-02	3.08336269E-03	-2.45566608E-02	-3.51999370E-06	-2.00419223E-02	-3.50518960E-03
24	-2.83361607E-02	1.16844286E-02	-2.64446779E-02	7.89827473E-03	-2.36806037E-02	3.49285337E-03	-1.92051360E-02	-6.75563461E-04
25	-3.10470633E-02	1.05926293E-02	-2.79477869E-02	7.71316302E-03	-2.38625576E-02	4.36741259E-03	-1.87358939E-02	6.66927359E-04
26	-2.81670795E-02	1.57413325E-02	-2.61020249E-02	1.18385678E-02	-2.29706639E-02	7.38917661E-03	-1.80625267E-02	2.98958983E-03
27	-3.05765608E-02	1.48882223E-02	-2.75293657E-02	1.16549883E-02	-2.34166344E-02	7.92846070E-03	-1.81323607E-02	3.84939346E-03
28	-2.71305877E-02	1.93245717E-02	-2.51600203E-02	1.53230418E-02	-2.21926048E-02	1.06830386E-02	-1.73781630E-02	5.90809682E-03
29	-2.93788211E-02	1.85767642E-02	-2.66036760E-02	1.51246384E-02	-2.26697574E-02	1.10511189E-02	-1.75375588E-02	6.57607034E-03
30	-2.98358739E-02	2.22935932E-02	-2.39751045E-02	1.82512376E-02	-2.11095875E-02	1.34970067E-02	-1.65410037E-02	8.40865099E-03
31	-2.62863733E-02	2.17110618E-02	-2.54041924E-02	1.80687866E-02	-2.17556449E-02	1.37261493E-02	-1.67579133E-02	8.91770117E-03
32	-2.42778165E-02	2.47232123E-02	-2.26292002E-02	2.06877060E-02	-1.99585437E-02	1.58357227E-02	-1.56430478E-02	1.04966373E-02
33	-2.66636384E-02	2.43114805E-02	-2.41465345E-02	2.05405601E-02	-2.07147208E-02	1.60001373E-02	-1.59561423E-02	1.08696999E-02

ROW	CHORD 9		CHORD 10		CHORD 11		CHORD 12	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY

19	-2.55259243E-02	-1.97606723E-02	-1.65726273E-02	-1.89298755E-02	0.	0.	0.	0.	
20	-1.61412604E-02	-1.22913695E-02	-9.80053148E-03	-1.36362870E-02	1.10794454E-02	1.05955449E-02	0.	0.	
21	-1.74744322E-02	-1.32599614E-02	-1.02335305E-02	-1.41645819E-02	1.78471129E-02	1.25946556E-02	1.16311944E-03	6.26503715E-04	
22	-1.57967273E-02	-9.31559556E-03	-9.84003651E-03	-1.35098295E-02	2.81171848E-02	1.46408357E-02	4.61711867E-03	2.28436453E-03	
23	-1.49396138E-02	-8.09635379E-03	-8.38649828E-03	-1.12506069E-02	3.60612125E-02	1.27059992E-02	6.58320169E-03	1.58140658E-03	
24	-1.39520516E-02	-5.78332840E-03	-7.17765922E-03	-9.56439179E-03	4.17276699E-02	7.21638329E-03	1.04482331E-02	1.59426211E-03	
25	-1.35229399E-02	-4.42223203E-03	-6.76934638E-03	-8.26180481E-03	4.41397703E-02	-7.34915422E-04	1.15766673E-02	-6.45210097E-04	
26	-1.26624036E-02	-2.53040020E-03	-5.87722163E-03	-6.93507078E-03	4.69572737E-02	-8.97461989E-03	1.33856852E-02	-2.76231588E-03	
27	-1.25910156E-02	-1.54149850E-03	-5.62035202E-03	-5.90032363E-03	4.63529653E-02	-1.83111331E-02	1.33636910E-02	-3.82981572E-03	
28	-1.20677130E-02	-2.56646955E-05	-5.06859491E-03	-4.90644161E-03	4.51872967E-02	-2.74816020E-02	1.39189235E-02	-8.64359010E-03	
29	-1.21529590E-02	7.74236549E-04	-5.20730714E-03	-4.10311505E-03	4.27370943E-02	-3.64239780E-02	1.24981795E-02	-1.18814964E-02	

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
TAIL UPPER SURFACE NORMAL WASH
(MACH 1.200 RED. FREQ.= .50000)
MODE SHAPE 2

PAGE CONTINUED

ROW	CHORD 9 REAL	CHORD 9 IMAGINARY	CHORD 10 REAL	CHORD 10 IMAGINARY	CHORD 11 REAL	CHORD 11 IMAGINARY	CHORD 12 REAL	CHORD 12 IMAGINARY
30	-1.13607068E-02	2.09657463E-03	-4.75938727E-03	-3.29669287E-03	4.09917565E-02	-4.46305773E-02	1.20979134E-02	-1.46844504E-02
31	-1.16434988E-02	2.75538040E-03	-4.91897138E-03	-2.60756560E-03	3.69389560E-02	-5.27032714E-02	1.04671532E-02	-1.75665544E-02
32	-1.08709377E-02	3.87724276E-03	-4.46767084E-03	-1.96746854E-03	3.39315537E-02	-5.99058115E-02	0.	0.
33	-1.11438713E-02	4.41252218E-03	-4.63870147E-03	-1.39306731E-03	0.	0.	0.	0.

ROW	CHORD 13 REAL	CHORD 13 IMAGINARY	CHORD 14 REAL	CHORD 14 IMAGINARY	CHORD 15 REAL	CHORD 15 IMAGINARY	CHORD 16 REAL	CHORD 16 IMAGINARY
22	1.18454473E-03	6.89342320E-04	0.	0.	0.	0.	0.	0.
23	2.75826523E-03	9.38935130E-04	7.51679787E-04	3.13609382E-04	0.	0.	0.	0.
24	4.83053316E-03	8.93452950E-04	1.94020972E-03	4.52327671E-04	5.66505863E-04	1.70718127E-04	0.	0.
25	6.39107323E-03	1.00952742E-04	3.19869254E-03	1.39905863E-04	1.41981786E-03	1.59598195E-04	4.41015186E-04	6.17972166E-05
26	8.03644877E-03	-1.11508997E-03	4.65586578E-03	-4.09409200E-04	2.38709181E-03	-1.50783780E-04	1.09673289E-03	2.23414305E-06
27	8.40911009E-03	-3.04584950E-03	5.33423333E-03	-1.53639139E-03	3.30667695E-03	-7.25777348E-04	1.82619159E-03	-3.29137268E-04
28	9.03934072E-03	-4.89832448E-03	5.84244144E-03	-2.82022265E-03	3.92398929E-03	-1.60534939E-03	0.	0.
29	8.44797231E-03	-7.14273830E-03	5.81398097E-03	-4.34614532E-03	0.	0.	0.	0.
30	8.02746330E-03	-9.13926562E-03	0.	0.	0.	0.	0.	0.

ROW	CHORD 17 REAL	CHORD 17 IMAGINARY
26	3.54947168E-04	2.67341355E-05

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS

WING VELOCITY POTENTIALS

(MACH 1.200 RED. FREQ.= .50000)

MODE SHAPE 2

ROW	CHORD 1		CHORD 2		CHORD 3		CHORD 4	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
1	-6.63184769E-02	6.99825447E-04	-6.63184769E-02	6.99825447E-04	-6.63184769E-02	6.99825447E-04	-6.63184769E-02	6.99825447E-04
2	-1.97801526E-01	1.06032274E-02	-1.97801526E-01	1.06032274E-02	-1.97801526E-01	1.06032274E-02	-1.97801526E-01	1.06032274E-02
3	-3.27215061E-01	3.02371871E-02	-3.27215061E-01	3.02371871E-02	-3.27215061E-01	3.02371871E-02	-3.27215061E-01	3.02371871E-02
4	-4.52690913E-01	5.90062499E-02	-4.52690913E-01	5.90062499E-02	-4.52690913E-01	5.90062499E-02	-4.52690913E-01	5.90062499E-02
5	-5.72820386E-01	9.61220392E-02	-5.72820386E-01	9.61220392E-02	-5.72820386E-01	9.61220392E-02	-5.72820386E-01	9.61220392E-02
6	-6.86349473E-01	1.40572481E-01	-6.86349473E-01	1.40572481E-01	-6.86349473E-01	1.40572481E-01	-6.86349473E-01	1.40572481E-01
7	-7.92220506E-01	1.91153573E-01	-7.92220506E-01	1.91153573E-01	-7.92220506E-01	1.91153573E-01	-7.92220506E-01	1.91153573E-01
8	-8.89601234E-01	2.46507223E-01	-8.89601234E-01	2.46507223E-01	-8.89601234E-01	2.46507223E-01	-8.78809499E-01	2.36376541E-01
9	-9.77902331E-01	3.05162316E-01	-9.77902331E-01	3.05162316E-01	-9.68906048E-01	2.94662062E-01	-9.44152688E-01	2.69584305E-01
10	-1.05679945E+00	3.65581916E-01	-1.04945283E+00	3.54839787E-01	-1.02901545E+00	3.29063251E-01	-9.97376643E-01	2.96151547E-01
11	-1.12041939E+00	4.15341562E-01	-1.10393729E+00	3.89161759E-01	-1.07795893E+00	3.55521572E-01	-1.04147231E+00	3.16894320E-01
12	-1.16482969E+00	4.37437154E-01	-1.14839260E+00	4.14327181E-01	-1.11856163E+00	3.75043558E-01	-1.07837117E+00	3.31908232E-01
13	-1.19683799E+00	4.34075395E-01	-1.18244992E+00	4.20748755E-01	-1.15273527E+00	3.87880205E-01	-1.10961148E+00	3.41279931E-01
14	-1.22347731E+00	4.14653563E-01	-1.20910451E+00	4.04809431E-01	-1.18025898E+00	3.83665452E-01	-1.13651259E+00	3.45050063E-01
15	-1.24801429E+00	3.83210227E-01	-1.23336063E+00	3.75190194E-01	-1.20395529E+00	3.58850050E-01	-1.15961275E+00	3.32953755E-01

ROW	CHORD 5		CHORD 6		CHORD 7		CHORD 8	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
1	-6.63184769E-02	6.99825447E-04	-6.63184769E-02	6.99825447E-04	-6.63184769E-02	6.99825447E-04	-6.63184769E-02	6.99825447E-04
2	-1.97801526E-01	1.06032274E-02	-1.97801526E-01	1.06032274E-02	-1.97801526E-01	1.06032274E-02	-1.97801526E-01	1.06032274E-02
3	-3.27215061E-01	3.02371871E-02	-3.27215061E-01	3.02371871E-02	-3.27215061E-01	3.02371871E-02	-3.27215061E-01	3.02371871E-02
4	-4.52690913E-01	5.90062499E-02	-4.52690913E-01	5.90062499E-02	-4.52690913E-01	5.90062499E-02	-4.31035421E-01	5.18509973E-02
5	-5.72820386E-01	9.61220392E-02	-5.72820386E-01	9.61220392E-02	-5.54896716E-01	8.79472804E-02	-5.04367922E-01	6.90987110E-02
6	-6.86349473E-01	1.40572481E-01	-6.71238086E-01	1.31584297E-01	-6.29446382E-01	1.10566235E-01	-5.63710060E-01	8.49252329E-02
7	-7.79422470E-01	1.81520812E-01	-7.44311654E-01	1.58781501E-01	-6.90148366E-01	1.30552859E-01	-6.13078893E-01	9.94721747E-02
8	-8.49236846E-01	2.12298217E-01	-8.03921915E-01	1.82037984E-01	-7.40682396E-01	1.48208497E-01	-6.54641651E-01	1.12474107E-01
9	-9.06162895E-01	2.37781841E-01	-8.53471496E-01	2.01821332E-01	-7.83107124E-01	1.63319440E-01	-6.89725341E-01	1.23653293E-01
10	-9.53363296E-01	2.58611436E-01	-8.94951395E-01	2.17991041E-01	-8.18628469E-01	1.75651617E-01	-7.19452286E-01	1.32729028E-01
11	-9.92850345E-01	2.74750360E-01	-9.29824763E-01	2.30394637E-01	-8.49019485E-01	1.84954421E-01	-7.44581289E-01	1.39385784E-01
12	-1.02607161E+00	2.86153959E-01	-9.59320766E-01	2.38846379E-01	-8.74578487E-01	1.90965435E-01	-7.65941648E-01	1.43432165E-01
13	-1.05432670E+00	2.92734807E-01	-9.84439589E-01	2.43170154E-01	-8.96410824E-01	1.93533520E-01	-7.84144167E-01	1.44638073E-01
14	-1.07869460E+00	2.94424260E-01	-1.00615700E+00	2.43293291E-01	-9.15257652E-01	1.92505383E-01	-7.99889576E-01	1.42924930E-01
15	-1.10020318E+00	2.91265457E-01	-1.02530542E+00	2.39162874E-01	-9.31691651E-01	1.87866023E-01	-8.13728078E-01	1.38169207E-01

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY

1	-6.631647C9E-02	6.99825447C-04	-6.63184769E-02	6.39825447E-04
2	-1.9780192CE-01	1.06032274C-02	-1.57587972E-01	6.60206028E-03
3	-2.99774444E-01	2.43866111E-02	-2.08751114E-01	1.19663897E-02
4	-3.67333527E-01	3.57494077E-02	-2.48534137E-01	1.76262658E-02
5	-4.21240420E-01	4.67293668E-02	-2.80706427E-01	2.34318670E-02
6	-4.65829557E-01	5.73101529E-02	-3.08069576E-01	2.92269546E-02
7	-5.03457442E-01	6.72248226E-02	-3.30969647E-01	3.46723412E-02
8	-5.35232699E-01	7.61605875E-02	-3.50743423E-01	3.96982473E-02
9	-5.62332130E-01	8.38794754E-02	-3.67349192E-01	4.39258200E-02
10	-5.85231429E-01	9.00364358E-02	-3.81661317E-01	4.73447109E-02
11	-6.04717836E-01	9.44563009E-02	-3.93638296E-01	4.96062124E-02

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS

WING VELOCITY POTENTIALS

(MACH 1.200 RED. FREQ.= .50000)

MODE SHAPE 2

PAGE CONTINUED

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY
12	-6.21209689E-01	9.66617335E-02	-4.03949368E-01	5.07496370E-02
13	-6.35321693E-01	9.71596348E-02	-4.12613392E-01	5.04889462E-02
14	-6.47451767E-01	9.51715199E-02	-4.20176166E-01	4.89172888E-02
15	-6.58142073E-01	9.09024242E-02	-4.26709994E-01	4.58274281E-02

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS

TAIL VELOCITY POTENTIALS

(MACH 1.200 RED. FREQ.= .50000)

MODE SHAPE 2

ROW	CHORD 1		CHORD 2		CHORD 3		CHORD 4	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
19	3.97433780E-02	2.31088510E-02	3.91216173E-02	2.30340104E-02	5.78806629E-02	2.28405074E-02	5.57754206E-02	2.27629510E-02
20	1.46470060E-01	2.78757585E-02	1.45057517E-01	2.77702938E-02	1.43125207E-01	2.94306397E-02	1.40045624E-01	3.31633513E-02
21	2.01552933E-01	-5.37579613E-03	2.01274448E-01	-2.32696529E-03	1.99487290E-01	2.62429453E-03	1.96206358E-01	1.04770871E-02
22	2.56580431E-01	-4.70753809E-02	2.55802374E-01	-4.30567946E-02	2.54021831E-01	-3.50384370E-02	2.49149730E-01	-2.41029791E-02
23	3.08448622E-01	-9.74763524E-02	3.06874214E-01	-9.26065988E-02	3.03440111E-01	-8.27094581E-02	2.97336699E-01	-6.75252971E-02
24	3.54545105E-01	-1.55595509E-01	3.52155682E-01	-1.49457387E-01	3.47013540E-01	-1.37057780E-01	3.38513662E-01	-1.17763929E-01
25	3.93230914E-01	-2.19259555E-01	3.90080554E-01	-2.11507473E-01	3.83344452E-01	-1.95719526E-01	3.72601832E-01	-1.71411789E-01
26	4.23409796E-01	-2.85771694E-01	4.19514982E-01	-2.75976075E-01	4.11430948E-01	-2.56308588E-01	3.94204272E-01	-2.28690102E-01
27	4.44295615E-01	-3.52018374E-01	4.39753714E-01	-3.40039537E-01	4.25972110E-01	-3.17893554E-01	4.02342843E-01	-2.87754882E-01
28	4.55780187E-01	-4.14891134E-01	4.46458305E-01	-4.01960084E-01	4.27108548E-01	-3.78338436E-01	4.01364477E-01	-3.45836762E-01
29	4.54332338E-01	-4.72205637E-01	4.40185045E-01	-4.59374499E-01	4.19285624E-01	-4.35215577E-01	3.91594525E-01	-4.00829068E-01
30	4.37143590E-01	-5.22134107E-01	4.25676392E-01	-5.10412302E-01	4.03243902E-01	-4.86273229E-01	3.74763514E-01	-4.50826051E-01
31	4.09083927E-01	-5.64011702E-01	4.00473676E-01	-5.53005807E-01	3.81123364E-01	-5.29899932E-01	3.53722985E-01	-4.94311337E-01
32	3.74898221E-01	-5.97697388E-01	3.66908708E-01	-5.86474744E-01	3.52562795E-01	-5.64599112E-01	3.29866176E-01	-5.30358871E-01
33	3.36840700E-01	-6.22786219E-01	3.31036645E-01	-6.12047491E-01	3.19023216E-01	-5.90246446E-01	3.01479551E-01	-5.57447765E-01

ROW	CHORD 5		CHORD 6		CHORD 7		CHORD 8	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
19	5.27392407E-02	2.25273225E-02	4.85333313E-02	2.21201277E-02	4.29256515E-02	2.15236602E-02	3.55402096E-02	2.02975324E-02
20	1.34119663E-01	3.64134763E-02	1.24965086E-01	3.94574982E-02	1.12265350E-01	4.27409130E-02	9.44370744E-02	4.47694904E-02
21	1.90130695E-01	2.03093159E-02	1.78897556E-01	3.00571568E-02	1.62090265E-01	4.03214375E-02	1.39089447E-01	5.11807962E-02
22	2.41044741E-01	-9.58081912E-03	2.28247085E-01	8.29327055E-03	2.08086990E-01	2.76731701E-02	1.75224443E-01	4.28959113E-02
23	2.86599571E-01	-4.77504760E-02	2.70773363E-01	-2.26849413E-02	2.43073813E-01	2.25471358E-03	2.00846176E-01	2.11704993E-02
24	3.23826922E-01	-9.13774307E-02	3.01548347E-01	-6.24702939E-02	2.65034587E-01	-3.42866084E-02	2.19522689E-01	-8.53602719E-03
25	3.52230953E-01	-1.41518821E-01	3.20329212E-01	-1.09050184E-01	2.79463213E-01	-7.58958706E-02	2.29167812E-01	-4.44157259E-02
26	3.66271073E-01	-1.95777859E-01	3.30605361E-01	-1.58984353E-01	2.86127406E-01	-1.20475048E-01	2.32058896E-01	-8.28144432E-02
27	3.71596353E-01	-2.51240008E-01	3.32654184E-01	-2.10039671E-01	2.85300485E-01	-1.66149224E-01	2.31124392E-01	-1.21215542E-01
28	3.68089941E-01	-3.05952223E-01	3.27263806E-01	-2.60338692E-01	2.80059837E-01	-2.10677344E-01	2.25905927E-01	-1.58883436E-01
29	3.57083773E-01	-3.57939545E-01	3.16924269E-01	-3.08107460E-01	2.70517186E-01	-2.53121799E-01	2.17564360E-01	-1.94826837E-01
30	3.41233763E-01	-4.05593333E-01	3.02268759E-01	-3.52236864E-01	2.57429565E-01	-2.92580919E-01	2.06580637E-01	-2.28348195E-01
31	3.21539231E-01	-4.47771530E-01	2.84285562E-01	-3.91774332E-01	2.41727585E-01	-3.28257770E-01	1.93798630E-01	-2.58994292E-01
32	2.99267426E-01	-4.83436670E-01	2.64207216E-01	-4.25935686E-01	2.24422900E-01	-3.59638340E-01	1.79326366E-01	-2.86202224E-01
33	2.75879176E-01	-5.12058128E-01	2.43281831E-01	-4.54115447E-01	2.06002668E-01	-3.86107239E-01	1.63776446E-01	-3.09499650E-01

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY

19	2.60450000E-02	1.90352832E-02	1.70750952E-02	1.84678707E-02
20	7.15521769E-02	4.57770154E-02	4.11306969E-02	3.68189604E-02
21	1.04803119E-01	5.50223982E-02	5.71184533E-02	4.02919310E-02
22	1.30132826E-01	4.93833270E-02	7.50743746E-02	4.05107805E-02
23	1.50055431E-01	3.39158233E-02	8.70721134E-02	3.16234622E-02
24	1.63251455E-01	1.09206750E-02	9.34423749E-02	1.67325050E-02
25	1.69862355E-01	-1.69498835E-02	9.78418707E-02	2.79335586E-05
26	1.71529728E-0[illegible]	-4.68245435E-02	9.94733429E-02	-1.80265241E-02
27	1.69835881E-[illegible]	7.58091329E-02	9.75119620E-02	-3.68526302E-02
28	1.65623585E-01	-1.06053035E-01	9.42648411E-02	-5.49432734E-02
29	1.58868996E-01	-1.33989080E-01	9.07389581E-02	-7.21829427E-02

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS

TAIL VELOCITY POTENTIALS

(MACH 1.200 RED. FREQ.= .50000)

MODE SHAPE 2

PAGE CONTINUED

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY
30	1.30820379E-01	-1.60200176E-01	8.55962221E-02	-8.84275988E-02
31	1.40998919E-01	-1.84285674E-01	7.94168208E-02	-1.03457324E-01
32	1.29783770E-01	-2.05856326E-01	7.26917087E-02	-1.16966695E-01
33	1.17931938E-01	-2.24565247E-01	6.52551056E-02	-1.28768131E-01

ENTERING PROGRAM CHORDF CURRENT ELAPSED TIME IS CP = 122.634, PP = 56.058

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
SMOOTHED WING VELOCITY POTENTIALS
(MACH 1.200 RED. FREQ. = .50000)
MODE SHAPE 2

ROW	CHORD 1		CHORD 2		CHORD 3		CHORD 4	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
1	-6.63184769E-02	6.99825447E-04	-6.63184769E-02	6.99825447E-04	-6.63184769E-02	6.99825447E-04	-6.63184769E-02	6.99825447E-04
2	-1.97118157E-01	1.27157599E-02	-1.97083941E-01	1.27223759E-02	-1.97143415E-01	1.28083146E-02	-1.97483806E-01	1.30661618E-02
3	-3.24556639E-01	2.78274530E-02	-3.25551934E-01	2.98614676E-02	-3.27380349E-01	3.30453819E-02	-3.29647122E-01	3.96443884E-02
4	-4.48830232E-01	5.23722576E-02	-4.50871795E-01	5.63349495E-02	-4.54319883E-01	6.23455157E-02	-4.57878050E-01	6.67555593E-02
5	-5.69164048E-01	8.88699981E-02	-5.71621530E-01	9.34466986E-02	-5.75418680E-01	1.00118235E-01	-5.78361484E-01	1.04244901E-01
6	-6.84089498E-01	1.36746250E-01	-6.86020340E-01	1.40147900E-01	-6.88388640E-01	1.44566246E-01	-6.88319982E-01	1.45640959E-01
7	-7.91721792E-01	1.93055616E-01	-7.92141143E-01	1.93598327E-01	-7.91286080E-01	1.93003593E-01	-7.85936163E-01	1.88314745E-01
8	-8.90037439E-01	2.53205022E-01	-8.88123104E-01	2.49727622E-01	-8.82600909E-01	2.42173813E-01	-8.70275106E-01	2.29638882E-01
9	-9.77151748E-01	3.11676968E-01	-9.72364162E-01	3.03796575E-01	-9.61345816E-01	2.88568094E-01	-9.41206748E-01	2.67146750E-01
10	-1.05139632E+00	3.62752835E-01	-1.04383355E+00	3.50958405E-01	-1.02714544E+00	3.28743423E-01	-9.99328279E-01	2.98691636E-01
11	-1.11259656E+00	4.01236152E-01	-1.10208434E+00	3.86820042E-01	-1.08032556E+00	3.59640745E-01	-1.04588654E+00	3.22605876E-01
12	-1.16034915E+00	4.23175879E-01	-1.14766593E+00	4.08003403E-01	-1.12200226E+00	3.78903116E-01	-1.08270043E+00	3.37860004E-01
13	-1.19629959E+00	4.26589686E-01	-1.18223663E+00	4.12706675E-01	-1.15417112E+00	3.85193856E-01	-1.11208329E+00	3.44221897E-01
14	-1.22341965E+00	4.12187232E-01	-1.20879613E+00	4.01265594E-01	-1.17979639E+00	3.78514702E-01	-1.13676531E+00	3.42415923E-01
15	-1.24648491E+00	3.84093449E-01	-1.23189805E+00	3.76714729E-01	-1.20290018E+00	3.60523966E-01	-1.15981590E+00	3.34282086E-01

ROW	CHORD 5		CHORD 6		CHORD 7		CHORD 8	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
1	-6.63184769E-02	6.99825447E-04	-6.63184769E-02	6.99825447E-04	-6.63184769E-02	6.99825447E-04	-6.63184769E-02	6.99825447E-04
2	-1.98219650E-01	1.35987591E-02	-1.99178143E-01	1.42478878E-02	-1.99574854E-01	1.45287950E-02	-1.97359615E-01	1.38503823E-02
3	-3.31648431E-01	3.71963629E-02	-3.31782358E-01	3.75643401E-02	-3.27178757E-01	3.55904975E-02	-3.13350077E-01	3.07418372E-02
4	-4.59639168E-01	6.82277631E-02	-4.56277017E-01	6.65536327E-02	-4.42775937E-01	6.02536010E-02	-4.12652[illegible]8E-01	4.92501208E-02
5	-5.77356182E-01	1.03656555E-01	-5.67662406E-01	9.79173967E-02	-5.42778938E-01	8.57675835E-02	-4.95089647E-01	6.77768178E-02
6	-6.81620779E-01	1.40723786E-01	-6.63357301E-01	1.29082285E-01	-6.25897784E-01	1.10151881E-01	-5.61656328E-01	8.51798730E-02
7	-7.71638657E-01	1.76996946E-01	-7.42763071E-01	1.58127810E-01	-6.92670670E-01	1.32085035E-01	-6.14222480E-01	1.00704298E-01
8	-8.46727012E-01	2.10418947E-01	-8.06827782E-01	1.83714187E-01	-7.44994650E-01	1.50793840E-01	-6.55242880E-01	1.13912876E-01
9	-9.08041773E-01	2.39357113E-01	-8.57610296E-01	2.05D10171E-01	-7.85656331E-01	1.65942494E-01	-6.87464203E-01	1.24616871E-01
10	-9.57304800E-01	2.62652162E-01	-8.97844381E-01	2.21620898E-01	-8.17862559E-01	1.77521739E-01	-7.13632526E-01	1.32806731E-01
11	-9.96731103E-01	2.79667193E-01	-9.30502807E-01	2.33515726E-01	-8.44771107E-01	1.85738019E-01	-7.36200823E-01	1.38582793E-01
12	-1.02875604E+00	2.90336072E-01	-9.56361449E-01	2.40956070E-01	-8.69021374E-01	1.90902619E-01	-7.57036470E-01	1.42085996E-01
13	-1.05376254E+00	2.95215416E-01	-9.83563396E-01	2.44423251E-01	-8.92265063E-01	1.93320817E-01	-7.77128768E-01	1.43428578E-01
14	-1.07980829E+00	2.95527578E-01	-1.00718305E+00	2.44546327E-01	-9.14696881E-01	1.93181031E-01	-7.96296387E-01	1.42624789E-01
15	-1.10233295E+00	2.93215636E-01	-1.02879021E+00	2.42029937E-01	-9.34585222E-01	1.90443967E-01	-8.12894929E-01	1.39521595E-01

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY

1	-6.63184769E-02	6.99825447E-04	-6.63184769E-02	6.99825447E-04
2	-1.87618875E-01	1.15968923E-02	-1.45345422E-01	6.43275503E-03
3	-2.82095229E-01	2.30677982E-02	-2.03047262E-01	1.20415075E-02
4	-3.57193181E-01	3.47372587E-02	-2.45865286E-01	1.76860369E-02
5	-4.15793190E-01	4.62349894E-02	-2.78647672E-01	2.33853878E-02
6	-4.62303815E-01	5.72043569E-02	-3.04869815E-01	2.90472125E-02
7	-4.99799000E-01	6.73110300E-02	-3.26854662E-01	3.44972878E-02
8	-5.30491337E-01	7.62516302E-02	-3.45993044E-01	3.95090314E-02
9	-5.56269453E-01	8.37623829E-02	-3.62964003E-01	4.38330190E-02
10	-5.78331092E-01	8.96277668E-02	-3.77955130E-01	4.72265012E-02
11	-5.97336599E-01	9.38691743E-02	-3.90882692E-01	4.94829200E-02

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
SMOOTHED WING VELOCITY POTENTIALS
(MACH 1.200 RED. FREQ. = .50000)
MODE SHAPE 2

PAGE CONTINUED

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY
12	-6.14418106E-01	9.58535429E-02	-4.01612967E-01	5.04614257E-02
13	-6.29292840E-01	9.61020248E-02	-4.10180572E-01	5.01163937E-02
14	-6.42392395E-01	9.44986311E-02	-4.11010800E-01	4.85269414E-02
15	-6.53736026E-01	9.11988819E-02	-4.23138945E-01	4.59264449E-02

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
SMOOTHED TAIL VELOCITY POTENTIALS
(MACH 1.200 RED. FREQ. = .50000)
MODE SHAPE 2

ROW	CHORD 1		CHORD 2		CHORD 3		CHORD 4	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
19	9.97433780E-02	2.31088510E-02	5.91216173E-02	2.30340104E-02	5.78806629E-02	2.28405074E-02	5.57754206E-02	2.27629510E-02
20	1.37159179E-01	1.70348754E-02	1.36238081E-01	1.76367243E-02	1.34671664E-01	1.96073137E-02	1.31929613E-01	2.32984408E-02
21	2.01505110E-01	-7.60417390E-03	2.01017365E-01	-5.85533567E-03	2.00069169E-01	-1.51753043E-03	1.97212464E-01	5.96041923E-03
22	2.57299536E-01	-4.73861893E-02	2.57146395E-01	-4.41446737E-02	2.56433384E-01	-3.71176455E-02	2.52884636E-01	-2.57274212E-02
23	3.06928939E-01	-9.66213134E-02	3.06545565E-01	-9.38770040E-02	3.04984542E-01	-8.38683105E-02	2.99613792E-01	-6.84432957E-02
24	3.51082130E-01	-1.58445810E-01	3.49737711E-01	-1.51735395E-01	3.46053979E-01	-1.38584073E-01	3.37625229E-01	-1.19090063E-01
25	3.89184169E-01	-2.22915939E-01	3.86217079E-01	-2.14519415E-01	3.79335215E-01	-1.98266359E-01	3.66852495E-01	-1.74817963E-01
26	4.19830679E-01	-2.89101622E-01	4.14818298E-01	-2.79230274E-01	4.04135036E-01	-2.60151082E-01	3.87088015E-01	-2.33047351E-01
27	4.41221865E-01	-3.54181322E-01	4.34085351E-01	-3.43154958E-01	4.19624570E-01	-3.21756255E-01	3.98133717E-01	-2.91491434E-01
28	4.51596648E-01	-4.15733910E-01	4.42640543E-01	-4.03950425E-01	4.25090365E-01	-3.80929597E-01	3.99951651E-01	-3.48179012E-01
29	4.49666781E-01	-4.71834540E-01	4.39553477E-01	-4.59727650E-01	4.20185475E-01	-4.35896146E-01	3.92814621E-01	-4.01477207E-01
30	4.35050969E-01	-5.21147517E-01	4.24710021E-01	-5.09135864E-01	4.05180532E-01	-4.85305868E-01	3.77456800E-01	-4.50114203E-01
31	4.08708980E-01	-5.63020373E-01	3.99161280E-01	-5.51446654E-01	3.81214832E-01	-5.28281265E-01	3.55224362E-01	-4.93201984E-01
32	3.73375767E-01	-5.97577737E-01	3.65592568E-01	-5.86638113E-01	3.50547409E-01	-5.64464988E-01	3.28226101E-01	-5.30259066E-01
33	3.33995581E-01	-6.25815209E-01	3.28492378E-01	-6.15478988E-01	3.16808117E-01	-5.94067443E-01	2.99484055E-01	-5.61233238E-01

ROW	CHORD 5		CHORD 6		CHORD 7		CHORD 8	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
19	5.27392407E-02	2.25273225E-02	4.85333313E-02	2.21201277E-02	4.29256515E-02	2.15236602E-02	3.55402098E-02	2.02575324E-02
20	1.26981680E-01	2.73878696E-02	1.19055130E-01	3.17193941E-02	1.07386336E-01	3.62411181E-02	9.05652650E-02	3.94935158E-02
21	1.90709405E-01	1.52077630E-02	1.79339232E-01	2.55213333E-02	1.61652194E-01	3.59942943E-02	1.35933077E-01	4.41803853E-02
22	2.44310136E-01	-1.10304228E-02	2.29147868E-01	5.65873036E-03	2.05466085E-01	2.23719269E-02	1.71718108E-01	3.59106518E-02
23	2.88048902E-01	-4.83032874E-02	2.68525844E-01	-2.54842551E-02	2.38994491E-01	-2.59391333E-03	1.98340599E-01	1.66886498E-02
24	3.22128451E-01	-9.39973708E-02	2.97771442E-01	-6.53737189E-02	2.62756306E-01	-3.65656042E-02	2.16498047E-01	-1.12045819E-02
25	3.46749677E-01	-1.45159921E-01	3.17407723E-01	-1.11427642E-01	2.77551627E-01	-7.70377523E-02	2.27096678E-01	-4.53452198E-02
26	3.62172036E-01	-1.99349659E-01	3.28153529E-01	-1.61117522E-01	2.84390547E-01	-1.21474974E-01	2.31182925E-01	-8.32997251E-02
27	3.68773935E-01	-2.54287549E-01	3.30894603E-01	-2.12070002E-01	2.84421943E-01	-1.67449677E-01	2.29874905E-01	-1.22759653E-01
28	3.67113213E-01	-3.07987563E-01	3.26654694E-01	-2.62168500E-01	2.78862268E-01	-2.12779839E-01	2.24293890E-01	-1.61675472E-01
29	3.57987495E-01	-3.58607447E-01	3.16566656E-01	-3.09634841E-01	2.68924344E-01	-2.55666791E-01	2.15495789E-01	-1.98390583E-01
30	3.42494641E-01	-4.05499490E-01	3.01843554E-01	-3.53230887E-01	2.55746150E-01	-2.94832997E-01	2.04402619E-01	-2.31775339E-01
31	3.22093156E-01	-4.47261290E-01	2.83749763E-01	-3.92160164E-01	2.40319615E-01	-3.29659833E-01	1.91733984E-01	-2.61361067E-01
32	2.98662610E-01	-4.83786521E-01	2.63572069E-01	-4.26369497E-01	2.23419408E-01	-3.60325373E-01	1.77936549E-01	-2.87474081E-01
33	2.74964054E-01	-5.15315699E-01	2.42590774E-01	-4.56550636E-01	2.05331727E-01	-3.87942162E-01	1.63125515E-01	-3.11369708E-01

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY

19	2.60450060E-02	1.90552832E-02	1.70750952E-02	1.84678707E-02
20	6.80787278E-02	4.04667885E-02	3.94010563E-02	3.26520168E-02
21	1.02114556E-01	4.79949451E-02	5.84053396E-02	3.84330200E-02
22	1.26515746E-01	4.36974129E-02	7.37037680E-02	3.65091120E-02
23	1.47825765E-01	2.97647822E-02	8.51876260E-02	2.84585964E-02
24	1.60727357E-01	8.43660369E-03	9.29748121E-02	1.56893188E-02
25	1.68001598E-01	-1.80701021E-02	9.73609899E-02	-4.11863254E-04
26	1.70466964E-01	-4.76635347E-02	9.87707399E-02	-1.85296096E-02
27	1.69038365E-01	-7.84382042E-02	9.77087114E-02	-3.74706277E-02
28	1.64486310E-01	-1.08767221E-01	9.47107730E-02	-5.62142021E-02
29	1.57395767E-01	-1.37382106E-01	9.02951685E-02	-7.39627241E-02

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
SMOOTHED TAIL VELOCITY POTENTIALS
(MACH 1.200 RED. FREQ. = .50000)
MODE SHAPE 2

PAGE CONTINUED

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY
30	1.49029423E-01	-1.63454682E-01	8.49136605E-02	-9.01922222E-02
31	1.39286652E-01	-1.86678961E-01	7.89026902E-02	-1.04702691E-01
32	1.28702378E-01	-2.07353039E-01	7.24345246E-02	-1.17669622E-01
33	1.17367196E-01	-2.26460981E-01	6.54684096E-02	-1.29692531E-01

ENTERING PROGRAM FORCES CURRENT ELAPSED TIME IS CP = 123.887, PP = 60.520

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS

WING BOX LIFTS

(MACH 1.200 RCD.FREQ. = .50000)

MODE SHAPE 2

ROW	CHORD 1		CHORD 2		CHORD 3		CHORD 4	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
1	-3.97215651E-01	1.35929082E-02	-3.97164069E-01	1.36028822E-02	-3.97253729E-01	1.37324396E-02	-3.97766886E-01	1.41211589E-02
2	-3.90580254E-01	2.11846215E-02	-3.92081378E-01	2.42544355E-02	-3.94846411E-01	2.90484196E-02	-3.98289485E-01	3.29325302E-02
3	-3.82252977E-01	2.73287559E-02	-3.85585731E-01	3.31932352E-02	-3.91012651E-01	4.19421057E-02	-3.96123532E-01	4.79751000E-02
4	-3.73996770E-01	4.71420761E-02	-3.76597369E-01	5.07711631E-02	-3.80166406E-01	5.56841431E-02	-3.81626565E-01	5.76313589E-02
5	-3.63553687E-01	7.02621740E-02	-3.63844440E-01	6.91906240E-02	-3.62883753E-01	6.64105472E-02	-3.57828774E-01	6.10660666E-02
6	-3.49193047E-01	8.86567927E-02	-3.46460615E-01	8.23822268E-02	-3.39888974E-01	7.11910807E-02	-3.27494699E-01	5.79080607E-02
7	-3.29783766E-01	9.63960259E-02	-3.24041214E-01	8.59835319E-02	-3.12086371E-01	6.80203355E-02	-2.93139145E-01	4.80380167E-02
8	-3.04866679E-01	8.98246685E-02	-2.96699338E-01	7.73177985E-02	-2.80592080E-01	5.58088150E-02	-2.57043102E-01	3.18162087E-02
9	-2.74726874E-01	6.74343668E-02	-2.65121991E-01	5.53727320E-02	-2.46765890E-01	3.43740157E-02	-2.21269653E-01	9.98026936E-03
10	-2.40466015E-01	4.98559180E-02	-2.30626214E-01	2.07792311E-02	-2.12243053E-01	4.43150997E-03	-1.87679892E-01	-1.63250497E-02
11	-2.04074674E-01	-2.01684892E-02	-1.95215208E-01	-2.42098643E-02	-1.78966105E-01	-3.24139725E-02	-1.57943840E-01	-4.55401180E-02
12	-1.68504655E-01	-7.78130246E-02	-1.61634466E-01	-7.57410263E-02	-1.49216679E-01	-7.36774625E-02	-1.33581355E-01	-7.56826654E-02
13	-1.37741327E-01	-1.36195967E-01	-1.33427898E-01	-1.28381291E-01	-1.25647318E-01	-1.16002669E-01	-1.15928051E-01	-1.04340022E-01
14	-1.16875946E-01	-1.86407452E-01	-1.14993963E-01	-1.75139513E-01	-1.11313294E-01	-1.55170897E-01	-1.06201211E-01	-1.28661360E-01
15	-1.07953723E-01	-2.09354434E-01	-1.07326390E-01	-1.97213450E-01	-1.05712941E-01	-1.74534127E-01	-1.02928376E-01	-1.40506033E-01

ROW	CHORD 5		CHORD 6		CHORD 7		CHORD 8	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
1	-3.98876214E-01	1.49240795E-02	-4.00321197E-01	1.59026779E-02	-4.00919262E-01	1.63261614E-02	-3.97579662E-01	1.53034158E-02
2	-4.01359633E-01	3.51986354E-02	-4.01626647E-01	3.56575326E-02	-3.94714548E-01	3.26421818E-02	-3.73799187E-01	2.55540753E-02
3	-3.97824419E-01	4.91914791E-02	-3.91347569E-01	4.56756415E-02	-3.70198477E-01	3.62148631E-02	-3.27639754E-01	2.20321061E-02
4	-3.77241148E-01	5.42285899E-02	-3.62257916E-01	4.53579546E-02	-3.31054862E-01	3.13672096E-02	-2.78907724E-01	1.45671281E-02
5	-3.45317007E-01	5.15562486E-02	-3.21977014E-01	3.74992493E-02	-2.84643330E-01	2.09465936E-02	-2.31410071E-01	4.65717477E-03
6	-3.06964229E-01	4.23827223E-02	-2.76882413E-01	2.44348834E-02	-2.36985476E-01	7.23640692E-03	-1.88117491E-01	-6.52558877E-03
7	-2.66305195E-01	2.79055432E-02	-2.32102668E-01	8.08438473E-03	-1.92753785E-01	-7.99700767E-03	-1.51157465E-01	-1.81056155E-02
8	-2.26677329E-01	9.33878777E-03	-1.91510125E-01	-1.00049594E-02	-1.55260544E-01	-2.34574256E-02	-1.21807340E-01	-2.94747270E-02
9	-1.90637999E-01	-1.20596437E-02	-1.57713704E-01	-2.86145123E-02	-1.26446754E-01	-3.82218095E-02	-1.00487389E-01	-4.02626633E-02
10	-1.59969413E-01	-3.49607483E-02	-1.32051684E-01	-4.68106982E-02	-1.06871052E-01	-5.19433781E-02	-8.67538918E-02	-5.03068332E-02
11	-1.35683519E-01	-5.79371412E-02	-1.14584485E-01	-6.39014123E-02	-9.56986178E-02	-6.43046753E-02	-7.92921967E-02	-5.96310642E-02
12	-1.18026903E-01	-7.94357765E-02	-1.04087455E-01	-7.93924315E-02	-9.06900945E-02	-7.54706392E-02	-7.59097972E-02	-6.83963531E-02
13	-1.06485694E-01	-9.77506678E-02	-9.80436516E-02	-9.29438243E-02	-8.81905000E-02	-8.57916709E-02	-7.35294000E-02	-7.69006154E-02
14	-9.97904451E-02	-1.10995609E-01	-9.26566271E-02	-1.04326361E-01	-8.31181436E-02	-9.58067036E-02	-6.81819961E-02	-8.55196361E-02
15	-9.72982854E-02	-1.17206063E-01	-8.93510578E-02	-1.10466222E-01	-7.90100018E-02	-1.01711083E-01	-6.39986477E-02	-9.06459757E-02

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY

1	-3.82894944E-01	1.19061519E-02	-3.18165317E-01	4.12092196E-03
2	-3.27359916E-01	1.49591002E-02	-2.06769675E-01	2.56368684E-03
3	-2.57949065E-01	6.61589198E-03	-1.52743548E-01	-3.33976552E-03
4	-2.04126452E-01	-7.93463293E-04	-1.15740509E-01	-7.46498569E-03
5	-1.63063742E-01	-7.70889395E-03	-9.12912121E-02	-1.07371504E-02
6	-1.32297626E-01	-1.44570547E-02	-7.55794936E-02	-1.37351619E-02
7	-1.09327690E-01	-2.12606552E-02	-6.54453286E-02	-1.69136809E-02
8	-9.28178767E-02	-2.82477879E-02	-5.83877825E-02	-2.05251600E-02
9	-8.04973521E-02	-3.54612575E-02	-5.25679600E-02	-2.46618767E-02
10	-7.11813710E-02	-4.28679082E-02	-4.68119595E-02	-2.92779668E-02
11	-6.37721413E-02	-5.03679530E-02	-4.06138234E-02	-3.42114571E-02

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS

WING BOX LIFTS

(MACH 1.200 RED.FREQ. = .50000)

MODE SHAPE 2

PAGE CONTINUED

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY
12	-3.74596892E-02	-5.78043018E-02	-3.41384900E-02	-3.92062991E-02
13	-3.17227248E-02	-6.49718898E-02	-2.82247455E-02	-4.39344020E-02
14	-4.63295066E-02	-7.16270061E-02	-2.43881753E-02	-4.80176656E-02
15	-4.35031367E-02	-7.53247223E-02	-2.30696938E-02	-5.01546867E-02

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS

TAIL BOX LIFTS

(MACH 1.200 RED.FREQ. = .50000)

MODE SHAPE 2

ROW	CHORD 1		CHORD 2		CHORD 3		CHORD 4	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
19	2.94530886E-01	6.64932824E-02	2.92212425E-01	6.72256014E-02	2.87999504E-01	6.97805643E-02	2.80699690E-01	7.50177029E-02
20	2.12010364E-01	-3.75857093E-02	2.12152216E-01	-2.99300274E-02	2.12396507E-01	-2.32539572E-02	2.10894522E-01	-1.21378085E-02
21	1.61878620E-01	-7.69678962E-02	1.62861775E-01	-7.30372254E-02	1.63714453E-01	-6.55091766E-02	1.61750516E-01	-5.41880214E-02
22	1.63671051E-01	-1.11765058E-01	1.63504215E-01	-1.06981511E-01	1.61077640E-01	-9.85031336E-02	1.56948552E-01	-8.68793571E-02
23	1.51264711E-01	-1.36735782E-01	1.48974362E-01	-1.31544559E-01	1.43494961E-01	-1.22467941E-01	1.34595581E-01	-1.10788099E-01
24	1.39848976E-01	-1.51971474E-01	1.35282866E-01	-1.46901507E-01	1.25946265E-01	-1.37856149E-01	1.13275165E-01	-1.26603322E-01
25	1.29933932E-01	-1.58052932E-01	1.19564618E-01	-1.53584053E-01	1.07387125E-01	-1.45335640E-01	9.20497520E-02	-1.35111625E-01
26	1.07359962E-01	-1.55906944E-01	1.00087162E-01	-1.52443562E-01	8.67535949E-02	-1.45754519E-01	7.04629508E-02	-1.37183075E-01
27	8.33071320E-02	-1.46782870E-01	7.62591066E-02	-1.44614168E-01	6.37669719E-02	-1.40118005E-01	4.85418042E-02	-1.33754139E-01
28	5.43043608E-02	-1.32209235E-01	4.86385529E-02	-1.31475876E-01	3.89385561E-02	-1.29563324E-01	2.67990625E-02	-1.25814625E-01
29	2.22399040E-02	-1.13950313E-01	1.89414856E-02	-1.14617667E-01	1.35744127E-02	-1.15534602E-01	6.23545681E-03	-1.14391620E-01
30	-9.63145674E-03	-9.39627186E-02	-9.94979052E-03	-9.58005990E-02	-1.02198671E-02	-9.87577539E-02	-1.16580268E-02	-1.00534624E-01
31	-3.66766273E-02	-7.43519946E-02	-3.39782479E-02	-7.69209091E-02	-2.95344056E-02	-8.12153600E-02	-2.48978739E-02	-8.53004907E-02
32	-5.28769134E-02	-5.73292000E-02	-4.79037183E-02	-5.99731195E-02	-4.06502774E-02	-6.41216544E-02	-3.10057681E-02	-6.97383545E-02
33	-5.61542084E-02	-5.17396212E-02	-5.03133639E-02	-5.41092721E-02	-4.23210481E-02	-5.75739501E-02	-3.05372041E-02	-6.34422365E-02

ROW	CHORD 5		CHORD 6		CHORD 7		CHORD 8	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
19	2.68386791E-01	8.05239074E-02	2.50437100E-01	8.60194661E-02	2.24451482E-01	9.13762451E-02	1.88085403E-01	9.36321154E-02
20	2.05259062E-01	1.66351703E-03	1.94025376E-01	1.70330234E-02	1.75362886E-01	3.25539353E-02	1.47396590E-01	4.51215842E-02
21	1.75358526E-01	-3.88468145E-02	1.63418943E-01	-2.13540056E-02	1.44261356E-01	-4.74337293E-03	1.17924476E-01	8.19225354E-03
22	1.47847854E-01	-7.14361020E-02	1.33888003E-01	-5.39790289E-02	1.14360707E-01	-3.76273033E-02	9.04917936E-02	-2.42732383E-02
23	1.22153652E-01	-9.62724900E-02	1.06002326E-01	-8.02328620E-02	8.60276489E-02	-6.49522222E-02	6.58394130E-02	-5.11951439E-02
24	9.78944860E-02	-1.13683419E-01	8.02295780E-02	-9.97873870E-02	6.17836301E-02	-8.59526793E-02	4.44718777E-02	-7.18700745E-02
25	7.48839581E-02	-1.24149582E-01	5.69454839E-02	-1.12598442E-01	4.03186206E-02	-1.00250529E-01	2.66726087E-02	-8.59778501E-02
26	5.31377641E-02	-1.28298887E-01	3.64439884E-02	-1.18908713E-01	2.25048874E-02	-1.07862050E-01	1.25183069E-02	-9.35883565E-02
27	3.28778695E-02	-1.26900409E-01	1.89474208E-02	-1.19250620E-01	8.41077335E-03	-1.09205068E-01	1.89035383E-03	-9.51683930E-02
28	1.45375864E-02	-1.20858353E-01	4.61665732E-03	-1.14449211E-01	-2.08552511E-03	-1.05106077E-01	-5.50978532E-03	-9.15852746E-02
29	-1.23314991E-03	-1.11206012E-01	-6.43871601E-03	-1.05625048E-01	-9.28217953E-03	-9.68073552E-02	-1.01481604E-02	-8.41299473E-02
30	-1.35628041E-02	-9.90997224E-02	-1.41502400E-02	-9.41970966E-02	-1.36399516E-02	-8.59740934E-02	-1.26447343E-02	-7.44913147E-02
31	-2.13531442E-02	-8.58128246E-02	-1.84804193E-02	-8.18856275E-02	-1.57684149E-02	-7.47015105E-02	-1.37599806E-02	-6.47956139E-02
32	-2.32741630E-02	-7.27295204E-02	-1.94125597E-02	-7.07150626E-02	-1.64121772E-02	-6.55219762E-02	-1.43814621E-02	-5.75970069E-02
33	-2.11263100E-02	-6.76076427E-02	-1.76059184E-02	-6.67404818E-02	-1.51391694E-02	-6.27145807E-02	-1.35260067E-02	-5.57354758E-02

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY

19	1.39991339E-01	9.23373999E-02	8.32942147E-02	7.90751510E-02
20	1.10632483E-01	5.04360547E-02	5.90224862E-02	3.40387006E-02
21	8.63127384E-02	1.50818051E-02	4.78699816E-02	1.13538123E-02
22	6.49424992E-02	-1.46314300E-02	3.67249047E-02	-7.66663250E-03
23	4.55843523E-02	-3.83719577E-02	2.62063325E-02	-2.28682566E-02
24	2.95723444E-02	-5.60410637E-02	1.67831047E-02	-3.42263744E-02
25	1.65201716E-02	-6.77771167E-02	8.77887623E-03	-4.18508766E-02
26	8.32936778E-03	-7.39596418E-02	2.37717083E-03	-4.59911155E-02
27	-1.20230608E-03	-7.52134345E-02	-2.37356650E-03	-4.70407895E-02
28	-6.37367283E-03	-7.24126447E-02	-5.55491626E-03	-4.55428279E-02
29	-9.56995023E-03	-6.66848728E-02	-7.37343156E-03	-4.21942758E-02

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
TAIL BOX LIFTS
(MACH 1.200 RED.FREQ. = .50000)
MODE SHAPE 2

PAGE CONTINUED

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY
30	-1.12963620E-02	-5.94152631E-02	-8.15556508E-03	-3.76511791E-02
31	-1.19699486E-02	-5.22503983E-02	-8.34271615E-03	-3.35334692E-02
32	-1.23095785E-02	-4.71033926E-02	-8.48597774E-03	-3.04298476E-02
33	-1.15314834E-02	-4.58758961E-02	-8.03437375E-03	-2.97035954E-02

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
WING PRESS. DIFFERENCE
(MACH 1.200 RED.FREQ. = .30000)
MODE SHAPE 2

ROW	CHORD 1		CHORD 2		CHORD 3		CHORD 4	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
1	-5.98825125E+00	2.04920801E-01	-5.98747362E+00	2.05071164E-01	-5.98882530E+00	2.07024316E-01	-5.99656146E+00	2.12884481E-01
2	-5.88821667E+00	3.19370166E-01	-5.91034918E+00	3.65649373E-01	-5.95253362E+00	4.37921402E-01	-6.00443990E+00	4.96476374E-01
3	-5.76286045E+00	4.11996497E-01	-5.81292361E+00	5.00406849E-01	-5.89473751E+00	6.32301034E-01	-5.97178693E+00	7.23251845E-01
4	-5.63821345E+00	7.10693537E-01	-5.67741895E+00	7.65404002E-01	-5.73120[illegible]1E+00	8.39470043E-01	-5.75323694E+00	8.68825426E-01
5	-5.46077804E+00	1.05954364E+00	-5.48516131E+00	1.04308790E+00	-5.47067841E+00	1.00117667E+00	-5.39447174E+00	9.20937256E-01
6	-5.26426326E+00	1.33655129E+00	-5.22309029E+00	1.24195800E+00	-5.12401908E+00	1.07324592E+00	-4.93716835E+00	8.72996862E-01
7	-4.97167734E+00	1.45322477E+00	-4.88510511E+00	1.29625052E+00	-4.70487906E+00	1.02544514E+00	-4.41923689E+00	7.24200350E-01
8	-4.59603812E+00	1.35415783E+00	-4.47291082E+00	1.16560967E+00	-4.23008477E+00	8.41349542E-01	-3.87507056E+00	4.79647[illegible]93E-01
9	-4.14166346E+00	1.01661133E+00	-3.9968644[illegible]E+00	8.34775343E-01	-3.72013576E+00	5.18207785E-01	-3.33576553E+00	1.50458222E-01
10	-3.62316156E+00	4.50094899E-01	-3.47682099E+00	3.13238695E-01	-3.19968441E+00	6.68075265E-02	-2.82938083E+00	-2.46109385E-01
11	-3.07654146E+00	-5.04051415E-01	-2.94297999E+00	-5.64977437E-01	-2.69801555E+00	-4.88659022E-01	-2.38116835E+00	-6.86543110E-01
12	-2.54030326E+00	-1.17307548E+00	-2.43373126E+00	-1.14183693E+00	-2.24952607E+00	-1.11072954E+00	-2.01381470E+00	-1.14095911E+00
13	-2.07852863E+00	-2.05323145E+00	-2.01150125E+00	-1.93542079E+00	-1.89420458E+00	-1.74880603E+00	-1.74768113E+00	-1.57298502E+00
14	-1.76197118E+00	-2.81019807E+00	-1.73359922E+00	-2.64032750E+00	-1.67811105E+00	-2.33928929E+00	-1.60104350E+00	-1.93964298E+00
15	-1.62747361E+00	-3.15613685E+00	-1.61800620E+00	-2.97310463E+00	-1.59368255E+00	-2.63120097E+00	-1.55170365E+00	-2.11820814E+00

ROW	CHORD 5		CHORD 6		CHORD 7		CHORD 8	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
1	-6.01328517E+00	2.24988964E-01	-6.03506913E+00	2.39741890E-01	-6.04408528E+00	2.46126143E-01	-5.99373893E+00	2.30707674E-01
2	-6.05072714E+00	3.30639394E-01	-6.05474952E+00	3.37557530E-01	-5.95054[illegible]1E+00	4.92099406E-01	-5.63523478E+00	3.85242160E-01
3	-5.99742878E+00	7.41589451E-01	-5.89978659E+00	6.88586205E-01	-5.58095202E+00	5.45959603E-01	-4.93935513E+00	3.32146497E-01
4	-5.68712429E+00	8.17526753E-01	-5.46124357E+00	6.83796893E-01	-4.99083984E+00	4.72878477E-01	-4.20469214E+00	2.19607720E-01
5	-5.20584975E+00	7.77239692E-01	-4.85398613E+00	5.65322453E-01	-4.29115966E+00	3.15781780E-01	-3.48863809E+00	7.02095513E-02
6	-4.62765987E+00	6.36943580E-01	-4.17415944E+00	3.68369728E-01	-3.57269048E+00	1.09092939E-01	-2.83597788E+00	-9.83769523E-02
7	-4.01470187E+00	4.20691892E-01	-3.49907938E+00	1.21876686E-01	-2.90587265E+00	-1.20559427E-01	-2.27878453E+00	-2.72952424E-01
8	-3.41728932E+00	1.40787523E-01	-2.88712377E+00	-1.50830438E-01	-2.34064076E+00	-3.53633997E-01	-1.83631474E+00	-4.44348229E-01
9	-2.87397597E+00	-1.81805969E-01	-2.37762355E+00	-4.31360064E-01	-1.90625654E+00	-5.76969237E-01	-1.51490439E+00	-6.06985503E-01
10	-2.41162964E+00	-5.27053112E-01	-1.99075403E+00	-7.05697827E-01	-1.61114173E+00	-7.83075889E-01	-1.30786413E+00	-7.58434197E-01
11	-2.04550602E+00	-8.73435268E-01	-1.72742610E+00	-9.63350037E-01	-1.44271095E+00	-9.69429456E-01	-1.19537484E+00	-6.98972118E-01
12	-1.77932254E+00	-1.19753939E+00	-1.56917742E+00	-1.19688594E+00	-1.36720462E+00	-1.13776270E+00	-1.14436325E+00	-1.03114397E+00
13	-1.60533224E+00	-1.47364676E+00	-1.47806366E+00	-1.40118087E+00	-1.32952181E+00	-1.29335810E+00	-1.10849741E+00	-1.15932040E+00
14	-1.50439736E+00	-1.67332177E+00	-1.39654970E+00	-1.57277907E+00	-1.25305316E+00	-1.44434040E+00	-1.02788227E+00	-1.28925702E+00
15	-1.46679669E+00	-1.76694788E+00	-1.34701788E+00	-1.66534095E+00	-1.19112059E+00	-1.53335226E+00	-9.64815917E-01	-1.36653947E+00

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY

1	-3.77235847E+00	1.79491993E-01	-4.81159819E+00	6.21252350E-02
2	-4.93513642E+00	2.25916921E-01	-3.11717014E+00	3.86490333E-02
3	-3.88873752E+00	9.97383243E-02	-2.30269562E+00	-5.03486596E-02
4	-3.07732205E+00	-1.19619092E-02	-1.74485383E+00	-1.12840405E-01
5	-2.43857992E+00	-1.16215949E-01	-1.37626681E+00	-1.61668633E-01
6	-1.99446176E+00	-2.17948301E-01	-1.13940374E+00	-2.07065357E-01
7	-1.65119206E+00	-3.20516436E-01	-9.86625455E-01	-2.54983333E-01
8	-1.39926214E+00	-4.25851426E-01	-8.80228941E-01	-3.09428429E-01
9	-1.21394324E+00	-5.34598571E-01	-7.92491816E-01	-3.71791781E-01
10	-1.07309954E+00	-6.46256032E-01	-7.05716843E-01	-4.41381956E-01
11	-9.61401203E-01	-7.59325461E-01	-6.12276425E-01	-5.15757121E-01

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
WING PRESS. DIFFERENCE
(MACH 1.200 RED.FREQ. = .50000)
MODE SHAPE 2

PAGE CONTINUED

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY
12	-6.66237408E-01	-8.71432638E-01	-5.14657102E-01	-5.91057198E-01
13	-7.79749415E-01	-9.79488093E-01	-4.25504049E-01	-6.62336031E-01
14	-8.98443591E-01	-1.07981775E+00	-3.67665577E-01	-7.23893546E-01
15	-8.55834462E-01	-1.13956292E+00	-3.47788765E-01	-7.56110352E-01

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS
TAIL PRESS. DIFFERENCE
(MACH 1.200 RED.FREQ. = .50000)
MODE SHAPE 2

ROW	CHORD 1		CHORD 2		CHORD 3		CHORD 4	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
19	4.44022021E+00	1.00242395E+00	4.40526807E+00	1.01346407E+00	4.34175589E+00	1.05198159E+00	4.23170705E+00	1.13093442E+00
20	3.19617630E+00	-4.91248051E-01	3.19831500E+00	-4.51212140E-01	3.20199782E+00	-3.50566595E-01	3.17935455E+00	-1.82984348E-01
21	2.74192038E+00	-1.16033472E+00	2.75674499E+00	-1.10107760E+00	2.76959959E+00	-9.67587996E-01	2.73999212E+00	-8.16915159E-01
22	2.46743394E+00	-1.68522316E+00	2.46491879E+00	-1.61280696E+00	2.44039725E+00	-1.48502076E+00	2.36608845E+00	-1.30975559E+00
23	2.28040132E+00	-2.06136948E+00	2.24587360E+00	-1.98310885E+00	2.16326792E+00	-1.84627367E+00	2.02910474E+00	-1.67019344E+00
24	2.10830263E+00	-2.29105617E+00	2.03946594E+00	-2.21462355E+00	1.89871138E+00	-2.07825964E+00	1.70768737E+00	-1.90861689E+00
25	1.89052545E+00	-2.36273760E+00	1.80250444E+00	-2.31536672E+00	1.61892182E+00	-2.19101722E+00	1.38770222E+00	-2.03688740E+00
26	1.61851232E+00	-2.35038561E+00	1.50887073E+00	-2.29817317E+00	1.30785965E+00	-2.19733205E+00	1.06226895E+00	-2.06811267E+00
27	1.25590227E+00	-2.21283502E+00	1.14964932E+00	-2.18014061E+00	9.61323271E-01	-2.11235840E+00	7.31795233E-01	-2.01641951E+00
28	8.18672359E-01	-1.99312921E+00	7.33253774E-01	-1.98207341E+00	5.87020820E-01	-1.95324060E+00	4.04011068E-01	-1.89672684E+00
29	3.35279169E-01	-1.71786560E+00	2.85553642E-01	-1.72792635E+00	2.04641972E-01	-1.73873454E+00	9.40030483E-02	-1.72451856E+00
30	-1.45199674E-01	-1.41654128E+00	-1.49998736E-01	-1.44424837E+00	-1.54070293E-01	-1.48882916E+00	-1.75751366E-01	-1.51561648E+00
31	-5.52923975E-01	-1.12089850E+00	-5.12241361E-01	-1.15962634E+00	-4.45247917E-01	-1.22436792E+00	-3.75349571E-01	-1.28595328E+00
32	-7.97149463E-01	-8.64270209E-01	-7.22175725E-01	-9.04128795E-01	-6.12825989E-01	-9.66670311E-01	-4.67429541E-01	-1.05134540E+00
33	-8.46556544E-01	-7.80004139E-01	-7.58502795E-01	-8.15727969E-01	-6.38013806E-01	-8.67959956E-01	-4.80365673E-01	-9.56427701E-01

ROW	CHORD 5		CHORD 6		CHORD 7		CHORD 8	
	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
19	4.05060517E+00	1.21394358E+00	3.77548133E+00	1.29679224E+00	3.38373340E+00	1.37754873E+00	2.83549414E+00	1.41155725E+00
20	3.09439679E+00	2.50784626E-02	2.92504260E+00	2.56782490E-01	2.64369497E+00	4.90769040E-01	2.22211736E+00	6.80233476E-01
21	2.64362925E+00	-5.85637763E-01	2.46363327E+00	-3.21923746E-01	2.17482177E+00	-7.15090375E-02	1.77777836E+00	1.23502869E-01
22	2.22889027E+00	-1.07693976E+00	2.01843759E+00	-8.13764480E-01	1.72405253E+00	-5.67252940E-01	1.36421512E+00	-3.65932836E-01
23	1.84153861E+00	-1.45135240E+00	1.59804519E+00	-1.20955591E+00	1.30596094E+00	-9.79191592E-01	9.92566498E-01	-7.71795834E-01
24	1.47581491E+00	-1.71364202E+00	1.20950640E+00	-1.50435146E+00	9.31423270E-01	-1.29578539E+00	6.70438782E-01	-1.08348213E+00
25	1.12891814E+00	-1.87162538E+00	8.58465470E-01	-1.69748539E+00	6.07826076E-01	-1.51133359E+00	4.02107721E-01	-1.29616486E+00
26	8.01062236E-01	-1.93417850E+00	5.49413797E-01	-1.79261630E+00	3.39273944E-01	-1.62608159E+00	1.88720577E-01	-1.41089756E+00
27	4.95652531E-01	-1.91309564E+00	2.85643117E-01	-1.79777074E+00	1.26797179E-01	-1.64632835E+00	2.84981562E-02	-1.43471751E+00
28	2.19162361E-01	-1.82209623E+00	6.95987278E-02	-1.72538677E+00	-3.14404740E-02	-1.58453372E+00	-8.30631390E-02	-1.38074900E+00
29	-1.85904345E-02	-1.67649371E+00	-9.70672961E-02	-1.59235751E+00	-1.39934122E-01	-1.45942579E+00	-1.52989275E-01	-1.26830668E+00
30	-2.04466964E-01	-1.49398453E+00	-2.13322894E-01	-1.42007469E+00	-2.05630007E-01	-1.29610823E+00	-1.90626541E-01	-1.12299682E+00
31	-3.21910760E-01	-1.29367701E+00	-2.78602803E-01	-1.23447228E+00	-2.37717800E-01	-1.12616764E+00	-2.07439512E-01	-9.76830634E-01
32	-3.50871239E-01	-1.09644028E+00	-2.92655348E-01	-1.06606999E+00	-2.47422880E-01	-9.87780957E-01	-2.16809001E-01	-8.68307579E-01
33	-3.18321258E-01	-1.01922356E+00	-2.65419206E-01	-1.00615062E+00	-2.28231566E-01	-9.45457877E-01	-2.03912223E-01	-8.40243912E-01

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY

19	2.11044865E+00	1.39203868E+00	1.25570753E+00	1.19210276E+00
20	1.66784743E+00	7.60352133E-01	8.89797459E-01	5.13152719E-01
21	1.30121349E+00	2.27366766E-01	7.21667127E-01	1.71165161E-01
22	9.73014786E-01	-2.20577107E-01	5.5364877GE-01	-1.15578834E-01
23	6.67209967E-01	-5.78479028E-01	3.95075328E-01	-3.44751940E-01
24	4.45819867E-01	-8.44850854E-01	2.53014823E-01	-5.15982008E-01
25	2.49050958E-01	-1.02177846E+00	1.32346539E-01	-6.30925704E-01
26	9.54188094E-02	-1.11496355E+00	3.58371967E-02	-6.93542154E-01
27	-1.81284612E-02	-1.13388519E+00	-3.57828613E-02	-7.09166585E-01
28	-9.60867332E-02	-1.09166169E+00	-8.37435136E-02	-6.86583964E-01
29	-1.44272428E-01	-1.00531228E+00	-1.11158663E-01	-6.36102642E-01

SAMPLE CASE --- TWO AR=2 SURFACES WITH HORIZONTAL AND VERTICAL SEPARATIONS

TAIL PRESS. DIFFERENCE

(MACH 1.200 RED.FREQ. = .50000)

MODE SHAPE 2

PAGE CONTINUED

ROW	CHORD 9		CHORD 10	
	REAL	IMAGINARY	REAL	IMAGINARY
30	-1.69699057E-01	-8.95718793E-01	-1.22950071E-01	-5.70627996E-01
31	-1.80453766E-01	-7.87707407E-01	-1.25771178E-01	-5.05536069E-01
32	-1.89973878E-01	-7.10110365E-01	-1.27930928E-01	-4.58747213E-01
33	-1.73843653E-01	-6.91609156E-01	-1.21122742E-01	-4.47798549E-01

SECTION LIFTS

(MACH 1.200 RED. FREQ. = .50000)

MODE SHAPE 2

WING

CHORD

	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
1	-4.14178604E+00	-7.62410686E-02	-4.09082028E+00	-8.78372846E-02	-3.98859565E+00	-1.11155716E-01	-3.83484957E+00	-1.49564478E-01
5	-3.62845563E+00	-2.25619564E-01	-3.36649421E+00	-3.23848097E-01	-3.03655545E+00	-4.00020976E-01	-2.61857201E+00	-4.43659370E-01
9	-2.08452363E+00	-4.3[illegible]1175DE-01	-1.33493772E+00	-3.35515650E-01				

TOTAL LIFT - [illegible]

-3.21255904E+01 -2.59287395E+00

SECTION LIFTS

TAIL

CHORD

	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY	REAL	IMAGINARY
1	1.38101091E+00	-1.42783647E+00	1.35633365E+00	-1.40470845E+00	1.30312439E+00	-1.35558662E+00	1.22415418E+00	-1.28064991E+00
5	1.11208616E+00	-1.17471445E+00	9.68867023E-01	-1.03667112E+00	8.05754573E-01	-8.77483637E-01	6.25322874E-01	-7.03464991E-01
9	4.33271594E-01	-5.11882055E-01	2.32736505E-01	-2.94431576E-01				

TOTAL LIFT - TAIL

9.44466186E+00 -1.00676363E+01

TOTAL LIFT

-2.26609286E+01 -1.26605102E+01

GENERALIZED FORCES

(MACH 1.200 RED. FREQ. = .50000)

WT. FUNCT	VELOCITY POTENTIAL MODE 1		VELOCITY POTENTIAL MODE 2	
	REAL	IMAGINARY	REAL	IMAGINARY
1	-3.65294231E+00	-1.49248849E+01	-3.21253904E+01	-2.59287395E+00
2	-1.31902372E+00	-4.90711150E+00	-1.14917114E+01	-3.45896395E+00

GENERALIZED AERODYNAMIC COEFFICIENTS
(MACH 1.200 RED.FREQ. = .50000)
REAL PART

WT.
FUNCT VELOCITY POTENTIAL MODES

	1	2
1	3.65294231E-01	3.21255904E+00
2	1.31502372E-01	1.14917114E+00

GENERALIZED AERODYNAMIC COEFFICIENTS
(MACH 1.200 RED.FREQ. = .50000)
IMAGINARY PART

PAGE CONTINUED

WT.
FUNCT VELOCITY POTENTIAL MODES

	1	2
1	2.9849V697E+00	5.16574791E-01
2	9.97422299E-01	6.91792789E-01

ENTERING PROGRAM FORCES CURRENT ELAPSED TIME IS CP = 125.982, FP = 66.297

****

PROGRAM FORCES IS BEING RECALLED TO COMPUTE AIR FORCES WITHOUT SMOOTHING.

****

APPENDIX B

PROGRAM LISTINGS

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      OVERLAY(AFMBOX,0,0)                                                DRIVER  00002
      PROGRAM DRIVER(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE1=1000,   DRIVER  00003
     1          TAPE2=1000,TAPE3=1000,MODESC =110,IVPSC=110,IGEOSC=110,  DRIVER  00004
     2          IWTFSC=110,IAICSC=110)                                   DRIVER  00005
C                                                                        DRIVER  00006
C         THIS IS A DUMMY (0,0) OVERLAY DRIVING PROGRAM                  DRIVER  00007
C                                                                        DRIVER  00008
      COMMON PKERNL(1640)                                                DRIVER  00009
      COMPLEX PKERNL                                                     DRIVER  00010
C                                                                        DRIVER  00011
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,          FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC           FILES   00003
      COMMON /ARRAYS/ KBXCDW,LBXCDW,LBCWC,KBXCDT,LBXCDT,KJALPH,LJALPH,   ARRAYS  00002
     1                KALPHA,KKERNL,LKERNL,KPNTRM,LPNTRM,KDEFSL,KELPHI,  ARRAYS  00003
     2                LMODES,KPNTSD,LPNTSD,KSDW,LSDW,KPNTDW,LPNTDW,      ARRAYS  00004
     3                KDW,LDW,KTVP,LTVP                                  ARRAYS  00005
      DATA ITPE1,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC/                      DRIVER  00014
     1   5LTAPE1,6LMODESC,5LIVPSC,6LIGEOSC,6LIWTFSC,6LIAICSC /           DRIVER  00015
      NT5 = 5                                                            DRIVER  00016
      NT6 = 6                                                            DRIVER  00017
      READ(5,5) LINK,L1,L2                                               DRIVER  00018
    5 FORMAT(A6,4X,2I10)                                                 DRIVER  00019
      WRITE(6,6) LINK,L1,L2                                              DRIVER  00020
    6 FORMAT(*1 PROGRAM BEGINS  *,A6,2I5)                                DRIVER  00021
      CALL OVERLAY(LINK,L1,L2,0)                                         DRIVER  00022
      WRITE(6,7)                                                         DRIVER  00023
    7 FORMAT(*0 PROGRAM TERMINATES*)                                     DRIVER  00024
      CALL EXIT                                                          DRIVER  00025
      END                                                                DRIVER  00026
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      OVERLAY(AFMBOX,1,0)                                                    CONTROL 00002
      PROGRAM CONTROL                                                        CONTROL 00003
C                                                                            CONTROL 00004
C           SUPERSONIC UNSTEADY AERODYNAMICS,                                CONTROL 00005
C           WING / HORIZONTAL TAIL, VERTICAL SEPARATION,  DIHEDRAL           CONTROL 00006
C                                                                            CONTROL 00007
C        THIS PRIMARY OVERLAY CONTROLS THE CALLING OF THE COMPUTATIONAL      CONTROL 00008
C        SECTIONS OF THE PROGRAM                                             CONTROL 00009
C                                                                            CONTROL 00010
C        THIS IS THE TOTAL COMMON FOR ALL THE OVERLAY STRUCTURE              CONTROL 00014
      COMMON /CONTRL/ PREVEX,OMACH, TITLE(8), PRVGEOM,PRVMODE,DIHW,DIHT,     CONTRL  00002
     1                DEFAULT                                               CONTRL  00003
      LOGICAL     PRVGEOM,PRVMODE,DIHW,DIHT,DEFAULT                        CONTRL  00004
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,       PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                                   PROBLM  00003
      LOGICAL         SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                    PROBLM  00004
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,            GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,                 GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,            GEOMTY  00004
     3                IXBW,XCENTR                                          GEOMTY  00005
      LOGICAL COPLAN                                                       GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,MXBT,MYBT,MYBBT,MXBST,MYBST,         GEOM2   00002
     1                MYBBST,IXBT,IXBST,CAPL                               GEOM2   00003
      COMMON / KERN / ERR,MXSKRN,IPKERN,NPLKRN,NSPATK,NROMEA               KERN    00002
      COMMON /KVAL  / IKVAL,XKVAL(20), XKS(20)                             KVAL    00002
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,            FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWYFSC,IAICSC             FILES   00003
      COMMON /IOCONT/ OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,         IOCONT  00002
     1                PRPAIC,PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,          IOCONT  00003
     2                PRBL,PRDCP,PRGNAF,PRGNAC,PRSL,PRLW,PRNW,PRCM         BCSFRB  00001
      EQUIVALENCE (PRUW,PRDW)                                              IOCONT  00005
      LOGICAL   OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,PRPAIC,        IOCONT  00006
     1          PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,PRBL,PRSL,PRGNAF,      IOCONT  00007
     2          PRDCP,PRGNAC,PRUW,PRLW,PRNW,PRCM                           BCSFRB  00002
      COMMON /TAPEIO/ NFS,NWS,LS,NWR,ID(20),NID,ITYPE,LRS,LWS,M,N,         TAPEIO  00002
     1                PARM(10),IRR                                         TAPEIO  00003
      DIMENSION IPARM(10)                                                  TAPEIO  00004
      EQUIVALENCE (PARM,IPARM)                                             TAPEIO  00005
      COMMON / MODES/ SYM,SYMT,MTYPEW,MTYPET                               MODCOM  00002
      COMMON /ARRAYS/ KBXCDW,LBXCDW,LBCXC,KBXCDT,LBXCDT,KJALPH,LJALPH,     ARRAYS  00002
     1                KALPHA,KKERNL,LKERNL,KPNTRM,LPNTRM,KDEFSL,KELPHI,    ARRAYS  00003
     2                LMODES,KPNTSD,LPNTSD,KSDW,LSDW,KPNTDW,LPNTDW,        ARRAYS  00004
     3                KDW,LDW,KTVP,LTVP                                    ARRAYS  00005
      COMMON /SAMPLW/ ISMPLW,ICHORD(10),IBOXF(10),IBOXL(10),ZLOC(10)       SAMPLW  00002
      COMMON /PLANXY/ NALE,NATE,NTLE,NTTE, XWLE(10),YWLE(10),              PLANXY  00002
     1                XWTE(10),YWTE(10), XTLE(10),YTLE(10),                PLANXY  00003
     2                XTTE(10),YTTE(10)                                    PLANXY  00004
      COMMON /CHECKPR/ DPPCPR,GEOCPR,MODCPR,AICCPR,NWSCPR,SMCPR,GAFCPR     CHECKPR 00002
      LOGICAL  DPPCPR, GEOCPR, MODCPR, AICCPR,NWSCPR,  SMCPR, GAFCPR       CHECKPR 00003
      COMMON /RWBUFF/ BFCODE,IBFCNT,  BUFF(3280)                           RWBUFF  00002
      DATA            BFCODE,IBFCNT  / 8HBUFFSIZE,3280  /                  BCSCNA  00001
      DATA  TEV147 /6HAFMBOX /                                             FTNX1   00002
      DATA  PREVEX /10HNEVER EXEC /                                        FTNX1   00003
      DATA  EXEC   /10HAFMBOX EXC /                                        FTNX1   00004
      CALL RDINIT                                                          CONTROL 00030
    1 CONTINUE                                                             CONTROL 00031
      PROG = 6HDATAPP                                                      CONTROL 00032
```

```
      CALL DTIME(CPTIME,PPTIME)                                          CONTROL 00033
      WRITE (NT6,6005) PROG,CPTIME,PPTIME                                CONTROL 00034
 6005 FORMAT(1HD,10X,*ENTERING PROGRAM *,A6,*  CURRENT ELAPSED TIME IS * CONTROL 00035
     1 *  CP =*,F8.3,*,   PP =*,F8.3 )                                   CONTROL 00036
      CALL OVERLAY(TEV147,1,1,0)                                         CONTROL 00037
      PARM(3) = XMACH                                                    CONTROL 00038
      IPARM(5)= NKVALS                                                   CONTROL 00039
      IF (OMACH .EQ. XMACH .AND. PRVGEOM) GO TO 100                      CONTROL 00040
C                                                                        CONTROL 00041
      PROG = 6HGEOM                                                      CONTROL 00042
      CALL DTIME(CPTIME,PPTIME)                                          CONTROL 00043
      WRITE (NT6,6005) PROG,CPTIME,PPTIME                                CONTROL 00044
C         COMPUTE GEOMETRY SECTION                                       CONTROL 00045
      CALL OVERLAY(TEV147,1,2,0)                                         CONTROL 00046
C                                                                        CONTROL 00047
C         READ MODE SHAPES, PLACE IN INTERNAL STORAGE CONVENTION,        CONTROL 00048
C         STORE ON SCRATCH FILE.  COMPUTE AND STORE OPTIONAL             CONTROL 00049
C         THICKNESS SLOPE FUNCTIONS                                      CONTROL 00050
C                                                                        CONTROL 00051
  100 CONTINUE                                                           CONTROL 00052
      IF (NKVALS .LE. 0) GO TO 810                                       CONTROL 00053
      PROG = 6HMODES                                                     CONTROL 00054
      CALL DTIME(CPTIME,PPTIME)                                          CONTROL 00055
      WRITE (NT6,6005) PROG,CPTIME,PPTIME                                CONTROL 00056
      CALL OVERLAY(TEV147,1,3,0)                                         CONTROL 00057
C                                                                        CONTROL 00058
C         SPACE OUTPUT TAPE IF DESIRED                                   CONTROL 00059
      IF (NOUTP .LE. 0) GO TO 200                                        CONTROL 00060
      IF (PREVEX .NE. EXEC) REWIND NOUTP                                 CONTROL 00061
C         FILE SPACING A FUNCTION OF INSTALLATION CAPABILITIES           CONTROL 00062
  200 CONTINUE                                                           CONTROL 00063
C                                                                        CONTROL 00064
C         LOOP ON NUMBER OF K1 VALUES THRU KERNELS, DOWNWASHES AND       CONTROL 00065
C         AIR FORCES                                                     CONTROL 00066
      DO 600 IKVAL = 1,NKVALS                                            CONTROL 00067
C                                                                        CONTROL 00068
C         CALL KERNEL ROUTINES                                           CONTROL 00069
      PROG = 6HAIC                                                       CONTROL 00070
      CALL DTIME(CPTIME,PPTIME)                                          CONTROL 00071
      WRITE (NT6,6005) PROG,CPTIME,PPTIME                                CONTROL 00072
      CALL OVERLAY(TEV147,1,4,0)                                         CONTROL 00073
C                                                                        CONTROL 00074
      PROG = 6HVELPOT                                                    CONTROL 00075
      CALL DTIME(CPTIME,PPTIME)                                          CONTROL 00076
      WRITE (NT6,6005) PROG,CPTIME,PPTIME                                CONTROL 00077
C         CALL DOWNWASH AND VELOCITY POTENTIAL ROUTINES.                 CONTROL 00078
      CALL OVERLAY(TEV147,1,5,0)                                         CONTROL 00079
C                                                                        CONTROL 00080
      IF(.NOT.SMOOTH) GO TO 600                                          CONTROL 00081
      IF(CRDFIT) GO TO 600                                               CONTROL 00082
C                                                                        CONTROL 00083
      PROG = 6HSMOOTH                                                    CONTROL 00084
      CALL DTIME(CPTIME,PPTIME)                                          CONTROL 00085
      WRITE (NT6,6005) PROG,CPTIME,PPTIME                                CONTROL 00086
      CALL OVERLAY(TEV147,1,6,0)                                         CONTROL 00087
      GO TO 700                                                          CONTROL 00088
C                                                                        CONTROL 00089
```

```
  600 CONTINUE                                                          CONTROL 00090
      IF(.NOT.CRDFIT) GO TO 700                                         CONTROL 00091
C                                                                       CONTROL 00092
      PROG = 6HCHORDF                                                   CONTROL 00093
      CALL DTIME(CPTIME,PPTIME)                                         CONTROL 00094
      WRITE (NT6,6005) PROG,CPTIME,PPTIME                               CONTROL 00095
      CALL OVERLAY(TEV147,1,7,0)                                        CONTROL 00096
C                                                                       CONTROL 00097
  700 CONTINUE                                                          CONTROL 00098
      PROG = 6HFORCES                                                   CONTROL 00099
      CALL DTIME(CPTIME,PPTIME)                                         CONTROL 00100
      WRITE (NT6,6005) PROG,CPTIME,PPTIME                               CONTROL 00101
      CALL OVERLAY(TEV147,1,8,0)                                        CONTROL 00102
      IF(.NOT.(SMOOTH.OR.CRDFIT)) GO TO 800                             CONTROL 00103
      NIVPSC = IAICSC                                                   CONTROL 00104
      IAICSC = IVPSC                                                    CONTROL 00105
      IVPSC  = NIVPSC                                                   CONTROL 00106
      CALL DTIME(CPTIME,PPTIME)                                         CONTROL 00107
      WRITE (NT6,6005) PROG,CPTIME,PPTIME                               CONTROL 00108
      WRITE (NT6,6010)                                                  CONTROL 00109
 6010 FORMAT(1HO,5X,90(1H*),///6X,*PROGRAM FORCES IS BEING RECALLED TO C CONTROL 00110
     1OMPUTE AIR FORCES WITHOUT SMOOTHING.*//6X,90(1H*) )               CONTROL 00111
      CALL OVERLAY(TEV147,1,8,6HRECALL)                                 CONTROL 00112
C                                                                       CONTROL 00113
  800 CONTINUE                                                          CONTROL 00114
C         END OF LOOP ON REDUCED FREQUENCIES                            CONTROL 00115
C                                                                       CONTROL 00116
  810 CONTINUE                                                          CONTROL 00117
      IF (NOUTP .GT. 0) REWIND NOUTP                                    CONTROL 00118
      IF (NPLAIC .GT. 0) REWIND NPLAIC                                  CONTROL 00119
      IF (NSPAIC .GT. 0) REWIND NSPAIC                                  CONTROL 00120
      CALL DTIME(CPTIME,PPTIME)                                         CONTROL 00121
      WRITE (NT6,6006) CPTIME,PPTIME                                    CONTROL 00122
 6006 FORMAT(1HO,10X*PROGRAM COMPLETED *,6X,*  CURRENT ELAPSED TIME IS * CONTROL 00123
     1 *  CP =*,F8.3,*,   PP =*,F8.3 )                                  CONTROL 00124
      READ(5,8005) LINK,L1,L2                                           CONTROL 00125
 8005 FORMAT(A6,4X,3I10)                                                CONTROL 00126
C                                                                       CONTROL 00127
C         DETERMINE IF ANOTHER CYCLE IS WANTED.                         CONTROL 00128
C         IF L1 = -1,  RECYCLE                                          CONTROL 00129
      IF(L1.EQ.-1) GO TO 1                                              CONTROL 00130
C         IF L1 = -2,  RETURN TO CALLING PROGRAM                        CONTROL 00131
      IF(L1.EQ.-2) RETURN                                               CONTROL 00132
C         IF L1 =  0,  CALL EXIT                                        CONTROL 00133
      IF(L1.EQ.0) CALL EXIT                                             CONTROL 00134
C         IF L1 = POS.  CALL OVERLAY                                    CONTROL 00135
      IF(L1.GT.0) CALL OVERLAY(LINK,L1,L2,0)                            CONTROL 00136
      END                                                               CONTROL 00137
```

```
      SUBROUTINE FLUSH(I)                                              FLUSH   00002
C         ROUTINE TO FORCE AN ERROR EXIT                               FLUSH   00003
      DIMENSION  MESAGE(4)                                             FLUSH   00004
      DATA MESAGE  /1OH PROGRAM F,1OHLUSHED VIA,1OH MODE 1    , 0 /    FLUSH   00005
      DATA NT5 /6LOUTPUT/                                              FLUSH   00006
      WRITE (NT5,8000)(MESAGE(I),I=1,3)                                FLUSH   00007
      ENDFILE NT5                                                      FLUSH   00008
      CALL REMARK(MESAGE)                                              FLUSH   00009
      CALL FLSHXXX                                                     FLUSH   00010
 8000 FORMAT(5HO*** , 3A10, 4H ***)                                    FLUSH   00011
      END                                                              FLUSH   00012
```

```
      SUBROUTINE RDINIT                                                 RDINIT  00002
      COMMON /TAPEIO/ NFS,NWS,LS,NWR,ID(20),NID,ITYPE,LRS,LWS,M,N,      RDINIT  00003
     1                PARM(10), IRR                                     RDINIT  00004
      DIMENSION IA(1)                                                   RDINIT  00005
      EQUIVALENCE (IA,NFS)                                              RDINIT  00006
      DO 10 I= 1,41                                                     RDINIT  00007
      IA(I) = 0                                                         RDINIT  00008
   10 CONTINUE                                                          RDINIT  00009
      NID = 20                                                          RDINIT  00010
      RETURN                                                            RDINIT  00011
      END                                                               RDINIT  00012
```

```
      SUBROUTINE DTIME(CPTIME,PPTIME)                                   DTIME   00002
C         ROUTINE TO INTERROGATE THE SYSTEM CLOCKS                      DTIME   00003
      PPTIME = 0                                                        DTIME   00004
      CALL SECOND(CPTIME)                                               DTIME   00005
      RETURN                                                            DTIME   00006
      END                                                               DTIME   00007
```

```
      SUBROUTINE READMX(INFILE,MXREAD,RANDIN, NFS, NMS, LS, NMR, K, NID, READMX  00002
     1                  ID, ITYPE, LRS, A, M, N, PARM, IRR )             READMX  00003
C                                                                       READMX  00004
C          ROUTINE TO READ A MATRIX ON TAPE OR DISK FILE.               READMX  00005
C        THIS VERSION WILL WORK WITH SEQUENTIAL FILES ONLY.             READMX  00006
C        SOME VARIABLES ARE PASSED FOR RANDOM OPERATION BUT             READMX  00007
C        ARE NOT CURRENTLY USED.                                        READMX  00008
C                                                                       READMX  00009
C      INPUT -                                                          READMX  00010
C        INFILE - TAPE NUMBER OR LEFT ADJUSTED FILE NAME                READMX  00011
C        MXREAD - .T. SNART FORMAT      (NOT USED)                      READMX  00012
C                 .F. TEL001 FORMAT                                     READMX  00013
C        RANDIN - .T. RANDOM FILE       (NOT USED)                      READMX  00014
C                 .F. SEQUENTIAL FILE                                   READMX  00015
C        NFS    - NUMBER OF FILES TO SPACE                             READMX  00016
C        NMS    - NUMBER OF MATRICES TO SPACE                          READMX  00017
C        LS     - LEVEL NUMBER TO SPACE (NOT USED)                     READMX  00018
C        NMR    - IDENTIFIER (NAME OR NUMBER) (NOT USED)               READMX  00019
C        K      - ROW DIMENSION OF ARRAY A                             READMX  00020
C                 (IF K=0, MATRIX WILL BE LEFT IN /RWBUFF/. IT WILL    READMX  00021
C                  BE STORED AS A ROW-WISE MATRIX, NOT AS A FORTRAN     READMX  00022
C                  COLUMN-WISE MATRIX. M-ROWS AND N-COLUMNS )           READMX  00023
C        NID    - NUMBER OF WORDS AVAILABLE IN ID ARRAY                READMX  00024
C      IN/OUT                                                           READMX  00025
C        ID     - IDENTIFICATION ARRAY                                 READMX  00026
C        ITYPE  - REAL,DIAGONAL,NULL,MIXED,COMPLEX                     READMX  00027
C      OUTPUT -                                                         READMX  00028
C        LRS    - LEVEL NUMBER OF MATRIX READ     (NOT USED)          READMX  00029
C        A      - ARRAY CONTAINING MATRIX                              READMX  00030
C        M      - ROW DIMENSION OF MATRIX                              READMX  00031
C        N      - COLUMN DIMENSION OF MATRIX                           READMX  00032
C        PARM   - ARRAY OF NUMERICAL PARAMETERS STORED WITH THE MATRIX READMX  00033
C        IRR    -                                                      READMX  00034
C                 0, NO ERROR                                          READMX  00035
C                 1, MATRIX SPACING IS NEGATIVE                        READMX  00036
C                 2, FILE SPACING IS NEGATIVE                          READMX  00037
C                 4, MATRIX DIMENSIONS ILLEGAL                         READMX  00038
C                 5, M .GT. K     .                                    READMX  00039
C                 1500 + I, ENCOUNTERED ' ' AFTER MATRIX I WHILE       READMX  00040
C                           SKIPPING MATRICES.                         READMX  00041
C                                                                      READMX  00042
      DIMENSION ID(1), A(K,1), PARM(10), B(16)                         READMX  00043
C                                                                      READMX  00044
      COMMON /RWBUFF/ BFCODE,IBFCNT,   BUFF(3280)                      READMX  00045
C                                                                      READMX  00047
      DIMENSION IBUFF(2500),  IPARM(10),IB(16)                         READMX  00048
      EQUIVALENCE (BUFF,IBUFF),(B,IB)                                  READMX  00049
C                                                                      READMX  00050
      LOGICAL   MXREAD,RANDIN                                          READMX  00051
      IRR = 0                                                          READMX  00052
C                                                                      READMX  00053
C        DO FILE SPACING                                               READMX  00054
C                                                                      READMX  00055
      IF(NFS) 215,230,220                                              READMX  00056
  215 CONTINUE                                                         READMX  00057
      IRR = 2                                                          READMX  00058
      GO TO 1000                                                       READMX  00059
```

```
  220 CONTINUE                                                          READMX  00060
      DO 225 I=1,NFS                                                    READMX  00061
  222 CONTINUE                                                          READMX  00062
      BUFFER IN (INFILE,1) (BUFF(1),BUFF(IBFCNT))                       READMX  00063
  221 CONTINUE                                                          READMX  00064
      IF(UNIT,INFILE) 221,222,225                                       READMX  00065
  225 CONTINUE                                                          READMX  00066
  230 CONTINUE                                                          READMX  00067
C                                                                       READMX  00068
C         DO MATRIX SPACING                                             READMX  00069
C                                                                       READMX  00070
      IF(NMS) 235,250,240                                               READMX  00071
  235 CONTINUE                                                          READMX  00072
      IRR = 1                                                           READMX  00073
      GO TO 1000                                                        READMX  00074
  240 CONTINUE                                                          READMX  00075
      NM2 = NMS + NMS                                                   READMX  00076
      DO 245 I=1,NM2                                                    READMX  00077
      BUFFER IN (INFILE,1) (BUFF(1),BUFF(IBFCNT))                       READMX  00078
  241 CONTINUE                                                          READMX  00079
      IF(UNIT,INFILE) 241,242,243                                       READMX  00080
  242 CONTINUE                                                          READMX  00081
      GO TO 245                                                         READMX  00082
  243 CONTINUE                                                          READMX  00083
      IRR = 1500 +(I+1)/2                                               READMX  00084
      GO TO 1000                                                        READMX  00085
  245 CONTINUE                                                          READMX  00086
  250 CONTINUE                                                          READMX  00087
C                                                                       READMX  00088
C         READ B HEADER CARD                                            READMX  00089
C                                                                       READMX  00090
      BUFFER IN (INFILE,1) (B(1),B(16))                                 READMX  00091
  300 CONTINUE                                                          READMX  00092
      IF (UNIT,INFILE) 300,310,305                                      READMX  00093
  305 CONTINUE                                                          READMX  00094
      IRR = 1500 + NMS +1                                               READMX  00095
      GO TO 1000                                                        READMX  00096
  310 CONTINUE                                                          READMX  00097
C                                                                       READMX  00098
C         SET PARAMETERS AND SIZES                                      READMX  00099
C                                                                       READMX  00100
      ID(2) =IB(1)                                                      READMX  00101
      M     =IB(2)                                                      READMX  00102
      N     =IB(3)                                                      READMX  00103
      MTN   =IB(6)                                                      READMX  00104
      DO 325 I=7,16                                                     READMX  00105
      PARM(I-6) = B(I)                                                  READMX  00106
  325 CONTINUE                                                          READMX  00107
C                                                                       READMX  00108
C         TEST FOR PROPER SIZES                                         READMX  00109
C                                                                       READMX  00110
      IF(M.GT.0.AND.N.GT.0.AND.MTN.LE.IBFCNT) GO TO 350                 READMX  00111
      IRR = 4                                                           READMX  00112
      GO TO 1000                                                        READMX  00113
  350 CONTINUE                                                          READMX  00114
C                                                                       READMX  00115
C         READ THE ARRAY                                                READMX  00116
```

```
C                                                                       READMX  00117
  400 CONTINUE                                                          READMX  00118
      BUFFER IN (INFILE,1) (BUFF(1),BUFF(MTN))                          READMX  00119
  410 CONTINUE                                                          READMX  00120
      IF (UNIT,INFILE) 410,420,415                                      READMX  00121
  415 CONTINUE                                                          READMX  00122
      IRR = 1500 +NMS +1                                                READMX  00123
      GO TO 1000                                                        READMX  00124
  420 CONTINUE                                                          READMX  00125
C                                                                       READMX  00126
C         IF K=0 LEAVE THE MATRIX IN THE BUFF AREA AND EXIT             READMX  00127
C         IF K.GT.0 TRANSFER BUFF TO ARRAY A                            READMX  00128
C                                                                       READMX  00129
      IF(K.LE.0) GO TO 1000                                             READMX  00130
C                                                                       READMX  00131
C         TRANSFORM BUFF TO ARRAY A                                     READMX  00132
C                                                                       READMX  00133
      IF(ITYPE.EQ.7HCOMPLEX) GO TO 475                                  READMX  00134
      IX = 0                                                            READMX  00135
      DO 450 I=1,M                                                      READMX  00136
      DO 450 J=1,N                                                      READMX  00137
      IX = IX +1                                                        READMX  00138
      A(I,J) = BUFF(IX)                                                 READMX  00139
  450 CONTINUE                                                          READMX  00140
      GO TO 500                                                         READMX  00141
  475 CONTINUE                                                          READMX  00142
      K2 = K+K                                                          READMX  00143
      CALL CBUFFR(A,K2,M,N,BUFF)                                        READMX  00144
C                                                                       READMX  00145
  500 CONTINUE                                                          READMX  00146
C                                                                       READMX  00147
 1000 CONTINUE                                                          READMX  00148
      RETURN                                                            READMX  00149
      END                                                               READMX  00150
```

```
      SUBROUTINE CBUFFR(A,K2,M,N,BUFF)                                  READMX  00151
      DIMENSION  A(K2,1),BUFF(1)                                        READMX  00152
C                                                                       READMX  00153
C         PUTS A COMPLEX ARRAY STORED IN BUFF INTO FORTRAN ARRAY A      READMX  00154
C                                                                       READMX  00155
      IX = 0                                                            READMX  00156
      IX2 = MMN                                                         READMX  00157
      MM = M+M-1                                                        READMX  00158
      DO 100 I=1,MM,2                                                   READMX  00159
      DO 100 J=1,N                                                      READMX  00160
      IX = IX +1                                                        READMX  00161
      IX2 = IX2 + 1                                                     READMX  00162
      A(I,J) = BUFF(IX)                                                 READMX  00163
      A(I+1,J) = BUFF(IX2)                                              READMX  00164
  100 CONTINUE                                                          READMX  00165
      RETURN                                                            READMX  00166
      END                                                               READMX  00167
```

```
      SUBROUTINE WRTEMX(IOUTFL, MXWRIT, RANDOU, NFS, NMS, LS, NMR, LWS,   WRTEMX  00002
     1       K, ID, A, ITYPE, M, N, PARM, IRR )                           WRTEMX  00003
C                                                                          WRTEMX  00004
C         ROUTINE TO WRITE A MATRIX ON TAPE OR DISK FILE.                  WRTEMX  00005
C       THIS VERSION WILL ONLY WORK WITH SEQUENTIAL FILES.                 WRTEMX  00006
C       SOME VARIABLES ARE PASSED FOR RANDOM OPERATION BUT                 WRTEMX  00007
C       ARE NOT CURRENTLY USED.                                            WRTEMX  00008
C                                                                          WRTEMX  00009
C       IOUTFL - TAPE NUMBER OR LEFT-JUSTIFIED FILE NAME                   WRTEMX  00010
C       MXWRIT - .T. SNARK FORMAT  (NOT USED)                              WRTEMX  00011
C                .F. TEL001 FORMAT (NOT USED).                             WRTEMX  00012
C       RANDOU - .T. RANDOM FILE     (NOT USED)                            WRTEMX  00013
C                .F. SEQUENTIAL FILE (NOT USED)                            WRTEMX  00014
C       NFS    - NUMBER OF FILES TO SPACE  (SEQ. ONLY)                     WRTEMX  00015
C       NMS    - NUMBER OF MATRICES TO SPACE                               WRTEMX  00016
C       LS     - LEVEL NUMBER TO SPACE      (NOT USED )                   WRTEMX  00017
C       NMR    - IDENTIFIER (NAME OR NUMBER) (NOT USED )                   WRTEMX  00018
C       LWS    - LEVEL NUMBER OF THIS MATRIX (NOT USED )                   WRTEMX  00019
C       K      - ROW DIMENSION OF A                                        WRTEMX  00020
C              - (IF 0, MATRIX IS ALREADY IN  /RWBUFF/ )                   WRTEMX  00021
C       ID     - ARRAY CONTAINING MATRIX NAME                              WRTEMX  00022
C       A      - ARRAY CONTAINING MATRIX                                   WRTEMX  00023
C       ITYPE  - REAL,DIAGONAL,NULL,MIXED,COMPLEX                          WRTEMX  00024
C       M      - ROW DIMENSION OF MATRIX                                   WRTEMX  00025
C       N      - COLUMN DIMENSION OF MATRIX                                WRTEMX  00026
C       PARM   - 10 WORD PARAMETER ARRAY                                   WRTEMX  00027
C       IRR    - ERROR RETURN                                              WRTEMX  00028
C              = 0, NO ERROR                                               WRTEMX  00029
C                1, MATRIX SPACING IS NEGATIVE                             WRTEMX  00030
C                2, FILE SPACING IS NEGATIVE                               WRTEMX  00031
C                4, MNN DIMENSIONS ARE .GT. IBGCNT                         WRTEMX  00032
C                1500 + I, ENCOUNTERED EOF AFTER MATRIX I/2 WHILE          WRTEMX  00033
C                          SKIPPING MATRICES.                              WRTEMX  00034
C                                                                          WRTEMX  00035
C                                                                          WRTEMX  00036
      DIMENSION ID(1), A(K,1), PARM(10), B(16)                             WRTEMX  00037
      DIMENSION  IB(16)                                                    WRTEMX  00038
      EQUIVALENCE (B,IB)                                                   WRTEMX  00039
      LOGICAL   MXWRIT,RANDOU                                              WRTEMX  00040
C                                                                          WRTEMX  00041
      COMMON /RWBUFF/ BFCODE,IBFCNT,   BUFF(3280)                          WRTEMX  00042
      DATA            BFCODE,IBFCNT  /8HBUFFSIZE, 3280 /                   WRTEMX  00043
C                                                                          WRTEMX  00044
C                                                                          WRTEMX  00045
C        TEST FOR PROPER SIZE                                              WRTEMX  00046
C                                                                          WRTEMX  00047
      ISIZ = MNN                                                           WRTEMX  00048
      IF(ITYPE.EQ.7HCOMPLEX) ISIZ = ISIZ+ISIZ                              WRTEMX  00049
      IF(ISIZ.LE.IBFCNT) GO TO 205                                         WRTEMX  00050
      IRR = 4                                                              WRTEMX  00051
      GO TO 1000                                                           WRTEMX  00052
C                                                                          WRTEMX  00053
  205 CONTINUE                                                             WRTEMX  00054
      IF(K.LE.0) GO TO 300                                                 WRTEMX  00055
      IF(K.GE.M) GO TO 210                                                 WRTEMX  00056
      IRR = 5                                                              WRTEMX  00057
      GO TO 1000                                                           WRTEMX  00058
```

```
  210 CONTINUE                                                          WRTEMX 00059
C                                                                       WRTEMX 00060
C         DO FILE SPACING                                               WRTEMX 00061
C                                                                       WRTEMX 00062
      IF(NFS) 215,230,220                                               WRTEMX 00063
  215 CONTINUE                                                          WRTEMX 00064
      IRR = 2                                                           WRTEMX 00065
      GO TO 1000                                                        WRTEMX 00066
  220 CONTINUE                                                          WRTEMX 00067
      DO 225 I=1,NFS                                                    WRTEMX 00068
  222 CONTINUE                                                          WRTEMX 00069
      BUFFER IN (IOUTFL,1) (BUFF(1),BUFF(IBFCNT))                       WRTEMX 00070
  221 CONTINUE                                                          WRTEMX 00071
      IF(UNIT,IOUTFL) 221,222,225                                       WRTEMX 00072
  225 CONTINUE                                                          WRTEMX 00073
  230 CONTINUE                                                          WRTEMX 00074
C                                                                       WRTEMX 00075
C         DO MATRIX SPACING                                             WRTEMX 00076
C                                                                       WRTEMX 00077
      IF(NMS) 235,250,240                                               WRTEMX 00078
  235 CONTINUE                                                          WRTEMX 00079
      IRR = 1                                                           WRTEMX 00080
      GO TO 1000                                                        WRTEMX 00081
  240 CONTINUE                                                          WRTEMX 00082
      NM2 = NMS + NMS                                                   WRTEMX 00083
      DO 245 I=1,NM2                                                    WRTEMX 00084
      BUFFER IN (IOUTFL,1) (BUFF(1),BUFF(IBFCNT))                       WRTEMX 00085
  241 CONTINUE                                                          WRTEMX 00086
      IF (UNIT,IOUTFL) 241,242,243                                      WRTEMX 00087
  242 CONTINUE                                                          WRTEMX 00088
      GO TO 245                                                         WRTEMX 00089
  243 CONTINUE                                                          WRTEMX 00090
      IRR = 1500 +(I+1)/2                                               WRTEMX 00091
      GO TO 1000                                                        WRTEMX 00092
  245 CONTINUE                                                          WRTEMX 00093
  250 CONTINUE                                                          WRTEMX 00094
C                                                                       WRTEMX 00095
C         CREATE B HEADER RECORD                                        WRTEMX 00096
C                                                                       WRTEMX 00097
  300 CONTINUE                                                          WRTEMX 00098
      IB(1) = ID(2)                                                     WRTEMX 00099
      IB(2) = M                                                         WRTEMX 00100
      IB(3) = N                                                         WRTEMX 00101
      B(4) = 0                                                          WRTEMX 00102
      IB(5) = 0                                                         WRTEMX 00103
      IB(6) = ISIZ                                                      WRTEMX 00104
      DO 325 I=7,16                                                     WRTEMX 00105
      B(I) = PARM(I-6)                                                  WRTEMX 00106
  325 CONTINUE                                                          WRTEMX 00107
C                                                                       WRTEMX 00108
      IF(K.LE.0) GO TO 400                                              WRTEMX 00109
C                                                                       WRTEMX 00110
C         PUT ARRAY A INTO BUFFER                                       WRTEMX 00111
C                                                                       WRTEMX 00112
      IF(ITYPE.EQ.7HCOMPLEX) GO TO 375                                  WRTEMX 00113
C                                                                       WRTEMX 00114
C         NOT COMPLEX PUT INTO BUFFER.                                  WRTEMX 00115
```

```
C                                                                       WRTEMX  00116
      IX = 0                                                            WRTEMX  00117
      DO 350 I=1,M                                                      WRTEMX  00118
      DO 350 J=1,N                                                      WRTEMX  00119
      IX = IX + 1                                                       WRTEMX  00120
      BUFF(IX) = A(I,J)                                                 WRTEMX  00121
  350 CONTINUE                                                          WRTEMX  00122
      GO TO 400                                                         WRTEMX  00123
C                                                                       WRTEMX  00124
C         COMPLEX, CALL ROUTINE TO STORE INTO BUFFER.                   WRTEMX  00125
C                                                                       WRTEMX  00126
  375 CONTINUE                                                          WRTEMX  00127
      K2 = K+K                                                          WRTEMX  00128
      CALL COMBUF(A,K2,M,N,BUFF)                                        WRTEMX  00129
      IX = 2*M*N                                                        WRTEMX  00130
C                                                                       WRTEMX  00131
  400 CONTINUE                                                          WRTEMX  00132
C                                                                       WRTEMX  00133
C         WRITE THE B HEADER RECORD AND THE BUFFER ARRAY RECORD         WRTEMX  00134
C                                                                       WRTEMX  00135
      BUFFER OUT (IOUTFL,1) (B(1),B(16))                                WRTEMX  00136
  500 CONTINUE                                                          WRTEMX  00137
      IF (UNIT,IOUTFL) 500,510,510                                      WRTEMX  00138
  510 CONTINUE                                                          WRTEMX  00139
C                                                                       WRTEMX  00140
      BUFFER OUT (IOUTFL,1) (BUFF(1),BUFF(IX))                          WRTEMX  00141
  520 CONTINUE                                                          WRTEMX  00142
      IF (UNIT,IOUTFL) 520,530,530                                      WRTEMX  00143
  530 CONTINUE                                                          WRTEMX  00144
C                                                                       WRTEMX  00145
 1000 CONTINUE                                                          WRTEMX  00146
      RETURN                                                            WRTEMX  00147
      END                                                               WRTEMX  00148
```

```
      SUBROUTINE COMBUF(A,K2,M,N,BUFF)                          WRTEMX  00149
      DIMENSION A(K2,1),BUFF(1)                                 WRTEMX  00150
C                                                               WRTEMX  00151
C         PUTS COMPLEX ARRAY A INTO BUFFER BUFF                 WRTEMX  00152
C                                                               WRTEMX  00153
      IX = 0                                                    WRTEMX  00154
      IX2 = M+N                                                 WRTEMX  00155
      MM = M+M-1                                                WRTEMX  00156
      DO 100 I=1,MM,2                                           WRTEMX  00157
      DO 100 J=1,N                                              WRTEMX  00158
      IX = IX + 1                                               WRTEMX  00159
      IX2 = IX2 + 1                                             WRTEMX  00160
      BUFF(IX) = A(I,J)                                         WRTEMX  00161
      BUFF(IX2)= A(I+1,J)                                       WRTEMX  00162
  100 CONTINUE                                                  WRTEMX  00163
      RETURN                                                    WRTEMX  00164
      END                                                       WRTEMX  00165
```

```
      OVERLAY(APMBOX,1,1)                                                    DATAPP  00002
      PROGRAM DATAPP                                                         DATAPP  00003
      COMMON /CONTRL/ PREVEX,OMACH, TITLE(8), PRVGEOM,PRVMODE,DIHW,DIHT,     CONTRL  00002
     1               DEFAULT                                                 CONTRL  00003
      LOGICAL     PRVGEOM,PRVMODE,DIHW,DIHT,DEFAULT                          CONTRL  00004
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,ORDFIT,         PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                                    PROBLM  00003
      LOGICAL         SMOOTH,ORDFIT,EXAIC,SUBDV,PLYWOOD                      PROBLM  00004
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,              FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC               FILES   00003
      COMMON / KERN / ERR,MXSKRN,IPKERN,NPLKRN,NSPATK,NROWEA                 KERN    00002
      COMMON /KVAL  / IKVAL,XKVAL(20), XKS(20)                               KVAL    00002
      DIMENSION XK1(20)                                                      DATAPP  00009
      EQUIVALENCE (XK1,XKVAL)                                                DATAPP  00010
      COMMON /IOCONT/ OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,           IOCONT  00002
     1                PRPAIC,PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,            IOCONT  00003
     2                PRBL,PRDCP,PRGNAF,PRGNAC,PRSL,PRLW,PRNW,PRCM           BCSFRB  00001
      EQUIVALENCE (PRUW,PRDW)                                                IOCONT  00005
      LOGICAL   OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,PRPAIC,          IOCONT  00006
     1          PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,PRBL,PRSL,PRGNAF,        IOCONT  00007
     2          PRDCP,PRGNAC,PRUW,PRLW,PRNW,PRCM                             BCSFRB  00002
      COMMON / MODES/ SYM,SYMT,MTYPEW,MTYPET                                 MODCOM  00002
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,              GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,                   GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,              GEOMTY  00004
     3                IXBW,XCENTR                                            GEOMTY  00005
      LOGICAL COPLAN                                                         GEOMTY  00006
      COMMON /SAMPLW/ ISMPLW,ICHORD(10),IBOXF(10),IBOXL(10),ZLOC(10)         SAMPLW  00002
      COMMON /CHECKPR/ DPPCPR,GEOCPR,MODCPR,AICCPR,NWSCPR,SMCPR,GAFCPR       CHECKPR 00002
      LOGICAL  DPPCPR, GEOCPR, MODCPR, AICCPR,NWSCPR,  SMCPR, GAFCPR         CHECKPR 00003
      EQUIVALENCE (CHECKPR,DPPCPR)                                           DATAPP  00016
      LOGICAL CHECKPR                                                        DATAPP  00017
      COMMON /ARRAYS/ KBXCDW,LBXCDW,LBOXC,KBXCDT,LBXCDT,KJALPH,LJALPH,       ARRAYS  00002
     1                KALPHA,KKERNL,LKERNL,KPNTRM,LPNTRM,KDEFSL,KELPHI,      ARRAYS  00003
     2                LMODES,KPNTSD,LPNTSD,KSDW,LSDW,KPNTDW,LPNTDW,          ARRAYS  00004
     3                KDW,LDW,KTVP,LTVP                                      ARRAYS  00005
      LOGICAL MXWRIT,RANDOU,MXREAD,RANDIN                                    FTNX1   00005
      INTEGER OAIC, OSAIC                                                    FTNX1   00006
      EQUIVALENCE (MACH,XMACH)                                               DATAPP  00020
      REAL MACH                                                              DATAPP  00021
      DATA  EXEC   /1CHAPMBOX EXC /                                          FTNX1   00007
      NAMELIST /CARDB / XMACH                                                DATAPP  00022
      NAMELIST /CARDC / DEFAULT,PRVGEOM,PRVMODE,SYM,MTYPEW,MTYPET,           DATAPP  00023
     1                  NSURF,DIHW,DIHT,ISMPLW,WTGNAF,WTBL,                  DATAPP  00024
     2                  PRGNAF,PRBL,PRSL,PRPAIC,PRSAIC,PRCOEF,PRMODS,        DATAPP  00025
     X                  PRDCP,PRGNAC,PRLW,PRNW,PRUW,PRCM,                    BCSFRB  00003
     3                  PRBOX,PRDW,PRSW,PRVP,SUBDV,EXAIC,SMOOTH,NDEG,        DATAPP  00027
     4                  DPPCPR,GEOCPR,MODCPR,AICCPR,NWSCPR,SMCPR,GAFCPR,     DATAPP  00028
     5                  NROWEA,ORDFIT,PLYWOOD                                DATAPP  00029
      NAMELIST /CARDD / OAIC,NAIC,OSAIC,NSAIC,INTAPE,NOUTP,INFSP,IOUFSP      DATAPP  00030
      NAMELIST /CARDE / XK1,XKS,XKVAL                                        DATAPP  00032
      MXWRIT = .FALSE.                                                       DATAPP  00033
      RANDOU = .FALSE.                                                       DATAPP  00034
      MXREAD = .FALSE.                                                       DATAPP  00035
      RANDIN = .FALSE.                                                       DATAPP  00036
      IF(PREVEX.EQ.EXEC) GO TO 200                                           DATAPP  00037
      OMACH = 0.0                                                            DATAPP  00038
```

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C                                                                       DATAPP  00039
C       SET CONTROL PARAMETERS TO DEFAULT OPTIONS                       DATAPP  00040
      DEFAULT = .FALSE.                                                 DATAPP  00041
  100 CONTINUE                                                          DATAPP  00042
      PRVGEOM = .FALSE.                                                 DATAPP  00043
      PRVMODE = .FALSE.                                                 DATAPP  00044
      SYM     = 1.0                                                     DATAPP  00045
      MTYPEW  = 2                                                       DATAPP  00046
      MTYPET  = 2                                                       DATAPP  00047
      NSURF   = 1                                                       DATAPP  00048
      DIHW    = .TRUE.                                                  DATAPP  00049
      DIHT    = .TRUE.                                                  DATAPP  00050
      ISHPLW  = 0                                                       DATAPP  00051
      WTGNAF  = .TRUE.                                                  DATAPP  00052
      WTBL    = .FALSE.                                                 DATAPP  00053
      PRGNAF  = .TRUE.                                                  DATAPP  00054
      PRBL    = .FALSE.                                                 DATAPP  00055
      PRSL    = .FALSE.                                                 DATAPP  00056
      PRPAIC  = .FALSE.                                                 DATAPP  00057
      PRSAIC  = .FALSE.                                                 DATAPP  00058
      PRCOEF  = .FALSE.                                                 DATAPP  00059
      PRMODS  = .FALSE.                                                 DATAPP  00060
      PRBOX   = .FALSE.                                                 DATAPP  00061
      PRDW    = .FALSE.                                                 DATAPP  00062
      PRSW    = .FALSE.                                                 DATAPP  00063
      PRDCP   = .FALSE.                                                 DATAPP  00064
      PRGNAC  = .FALSE.                                                 DATAPP  00065
      PRLW    = .FALSE.                                                 DATAPP  00066
      PRNW    = .FALSE.                                                 DATAPP  00067
      PRUW    = .FALSE.                                                 DATAPP  00068
      PRVP    = .FALSE.                                                 DATAPP  00069
      PRCH    = .FALSE.                                                 BCSFRB  00004
      SUBDV   = .FALSE.                                                 DATAPP  00070
      EXAIC   = .FALSE.                                                 DATAPP  00071
      SMOOTH  = .FALSE.                                                 DATAPP  00072
      CRDFIT  = .FALSE.                                                 DATAPP  00073
      NDEG = 0                                                          DATAPP  00074
      NROWEA = 0                                                        DATAPP  00075
      PLYWOOD = .FALSE.                                                 DATAPP  00076
      DPPCPR = .FALSE.                                                  DATAPP  00077
      GEOCPR = .FALSE.                                                  DATAPP  00078
      MODCPR = .FALSE.                                                  DATAPP  00079
      AICCPR = .FALSE.                                                  DATAPP  00080
      NWSCPR = .FALSE.                                                  DATAPP  00081
      SMCPR  = .FALSE.                                                  DATAPP  00082
      GAFCPR = .FALSE.                                                  DATAPP  00083
      PREVEX = EXEC                                                     DATAPP  00084
      IF(DEFAULT) 400,300                                               DATAPP  00085
  200 CONTINUE                                                          DATAPP  00086
      OMACH = XMACH                                                     DATAPP  00087
  300 CONTINUE                                                          DATAPP  00088
      READ (NT5,9005) TITLE                                             DATAPP  00089
 9005 FORMAT(8A10)                                                      DATAPP  00090
      READ(NT5,CARDB)                                                   DATAPP  00091
      IF(XMACH.GT.1.0) GO TO 310                                        DATAPP  00092
      WRITE (NT6,8005) XMACH                                            DATAPP  00093
      CALL FLUSH(1)                                                     DATAPP  0009
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  310 CONTINUE                                                          DATAPP 00095
      IF(XMACH.GE.1.2) GO TO 320                                        DATAPP 00096
      WRITE (NT6,8010)                                                  DATAPP 00097
      GO TO 350                                                         DATAPP 00098
  320 CONTINUE                                                          DATAPP 00099
      IF(XMACH.LE.3.0) GO TO 350                                        DATAPP 00100
C                                                                       DATAPP 00101
C         MACH NO. GREATER THAN 3.0                                     DATAPP 00102
      IF(XMACH.LT.5.0) GO TO 340                                        DATAPP 00103
      WRITE (NT6,8015) XMACH                                            DATAPP 00104
      CALL FLUSH(1)                                                     DATAPP 00105
  340 CONTINUE                                                          DATAPP 00106
      WRITE (NT6,8020)                                                  DATAPP 00107
  350 CONTINUE                                                          DATAPP 00108
 8005 FORMAT(52H0*** MACH NUMBER OF LESS THAN 1.0 CAN NOT BE USED.      DATAPP 00109
     1       14HMACH NUMBER = E15.6, 6H   *** )                         DATAPP 00110
 8010 FORMAT(62H0*** WARNING -- MACH NUMBER LESS THAN 1.2 IS BEING USED. DATAPP 00111
     1  *** )                                                          DATAPP 00112
 8015 FORMAT(43H0*** MACH NUMBER GREATER THAN 5.0. XMACH = E15.6,       DATAPP 00113
     1       25H  PROGRAM TERMINATED. *** )                            DATAPP 00114
 8020 FORMAT(64H0*** WARNING -- MACH NUMBER GREATER THAN 3.0 IS BEING US DATAPP 00115
     1ED. *** )                                                         DATAPP 00116
      READ (NT5,CARDC)                                                  DATAPP 00117
      IF(SUBDV)500,510                                                  DATAPP 00118
  500 NSUBDV =3                                                         DATAPP 00119
      GO TO 515                                                         DATAPP 00120
  510 NSUBDV =1                                                         DATAPP 00121
  515 CONTINUE                                                          DATAPP 00122
C                                                                       DATAPP 00123
      IF(DEFAULT) 100,400                                               DATAPP 00124
C                                                                       DATAPP 00125
C         CARD D                                                        DATAPP 00126
  400 CONTINUE                                                          DATAPP 00127
      OAIC   = 0                                                        DATAPP 00128
      NAIC   = 0                                                        DATAPP 00129
      OSAIC = 0                                                         DATAPP 00130
      NSAIC = 0                                                         DATAPP 00131
      INTAPE = 0                                                        DATAPP 00132
      NOUTP  = 1                                                        DATAPP 00133
      INFSP  = 0                                                        DATAPP 00134
      IOUFSP = 0                                                        DATAPP 00135
      READ (NT5,CARDD)                                                  DATAPP 00136
C                                                                       DATAPP 00137
      IF(OAIC.EQ.0) GO TO 520                                           DATAPP 00138
      NPLAIC = OAIC                                                     DATAPP 00139
      OPLAIC = .TRUE.                                                   DATAPP 00140
      GO TO 530                                                         DATAPP 00141
  520 CONTINUE                                                          DATAPP 00142
      NPLAIC = 0                                                        DATAPP 00143
      OPLAIC = .FALSE.                                                  DATAPP 00144
  530 CONTINUE                                                          DATAPP 00145
      IF(NAIC.EQ.0) GO TO 540                                           DATAPP 00146
      NPLAIC = NAIC                                                     DATAPP 00147
      OPLAIC = .FALSE.                                                  DATAPP 00148
  540 CONTINUE                                                          DATAPP 00149
C                                                                       DATAPP 00150
C         DETERMINE OPTIONS OF SPATIAL KERNELS                          DATAPP 00151
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      IF(OSAIC.EQ.0) GO TO 560                                          DATAPP 00152
      NSPAIC = OSAIC                                                    DATAPP 00153
      OSPAIC = .TRUE.                                                   DATAPP 00154
      GO TO 570                                                         DATAPP 00155
  560 CONTINUE                                                          DATAPP 00156
      NSPAIC = 0                                                        DATAPP 00157
      OSPAIC = .FALSE.                                                  DATAPP 00158
  570 CONTINUE                                                          DATAPP 00159
      IF(NSAIC.EQ.0) GO TO 580                                          DATAPP 00160
      NSPAIC = NSAIC                                                    DATAPP 00161
      OSPAIC = .FALSE.                                                  DATAPP 00162
  580 CONTINUE                                                          DATAPP 00163
C                                                                       DATAPP 00164
      IF (NOUTP.NE.0) GO TO 600                                         DATAPP 00165
      IF(WTGNAF) WRITE (NT6,9041)                                       DATAPP 00166
      IF(WTBL  ) WRITE (NT6,9042)                                       DATAPP 00167
      WTGNAF = .FALSE.                                                  DATAPP 00168
      WTBL   = .FALSE.                                                  DATAPP 00169
  600 CONTINUE                                                          DATAPP 00170
C         CARD E                                                        DATAPP 00171
      DO 610 I=1,20                                                     DATAPP 00172
      XKS(I) = -1.                                                      DATAPP 00173
      XK1(I) = -1.                                                      DATAPP 00174
  610 CONTINUE                                                          DATAPP 00175
      READ(NT5,CARDE)                                                   DATAPP 00176
      DO 620 I=1,20                                                     DATAPP 00177
      IF(XKS(I).NE.-1.0.OR .XK1(I).NE.-1.0) GO TO 620                   DATAPP 00178
      NKVALS = I-1                                                      DATAPP 00179
      GO TO 625                                                         DATAPP 00180
  620 CONTINUE                                                          DATAPP 00181
      NKVALS = 20                                                       DATAPP 00182
  625 CONTINUE                                                          DATAPP 00183
C                                                                       DATAPP 00184
      WRITE (NT6,9500)                                                  DATAPP 00185
      WRITE (NT6,9501)                                                  DATAPP 00186
      WRITE (NT6,9551) TITLE                                            DATAPP 00187
      WRITE (NT6,9580) XMACH                                            DATAPP 00188
      IF(DEFAULT)    WRITE (NT6,9575)                                   DATAPP 00189
      IF(SYM.EQ.1.0) WRITE (NT6,9552)                                   DATAPP 00190
      IF(SYM.EQ.-1.) WRITE (NT6,9553)                                   DATAPP 00191
      IF (PLYWOOD)   WRITE (NT6,9554)                                   DATAPP 00192
      IF (DPPCPR.AND.PLYWOOD) WRITE (NT6,9558)                          DATAPP 00193
      IF(.NOT.SUBDV) WRITE (NT6,9572)                                   DATAPP 00194
      IF(SUBDV)      WRITE (NT6,9573)                                   DATAPP 00195
      IF (SUBDV .AND. NROWEA .NE. 0) WRITE (NT6,9546) NROWEA            DATAPP 00196
      IF(NSURF.EQ.1) WRITE(NT6,9556)                                    DATAPP 00197
      IF(NSURF.EQ.2) WRITE(NT6,9557)                                    DATAPP 00198
      IF(.NOT.EXAIC) WRITE (NT6,9576)                                   DATAPP 00199
      IF(EXAIC)      WRITE (NT6,9577)                                   DATAPP 00200
      IF(CRDFIT) SMOOTH = .FALSE.                                       DATAPP 00201
      IF(SMOOTH)     WRITE (NT6,9581) NDEG                              DATAPP 00202
      IF(CRDFIT)     WRITE (NT6,9585) NDEG                              DATAPP 00203
      IF (.NOT. (SMOOTH .OR. CRDFIT) .OR. NDEG .LE. 10) GO TO 630       DATAPP 00204
      NDEG = 10                                                         DATAPP 00205
      WRITE (NT6,9043) NDEG                                             DATAPP 00206
  630 CONTINUE                                                          DATAPP 00207
      IF(PRBOX)      WRITE (NT6,9569)                                   DATAPP 00208
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      IF(PRCOEF)      WRITE (NT6,9582)                                  DATAPP  00209
      IF(PRMODS)      WRITE (NT6,9568)                                  DATAPP  00210
      IF(PRPAIC)      WRITE (NT6,9583)                                  DATAPP  00211
      IF(PRSAIC)      WRITE (NT6,9584)                                  DATAPP  00212
      IF(PRDW)        WRITE (NT6,9570)                                  DATAPP  00213
      IF(PRSW)        WRITE (NT6,9578)                                  DATAPP  00214
      IF (PRLW)       WRITE (NT6,9544)                                  DATAPP  00215
      IF (PRNW)       WRITE (NT6,9545)                                  DATAPP  00216
      IF(PRVP)        WRITE (NT6,9571)                                  DATAPP  00217
      IF(PRBL)        WRITE (NT6,9565)                                  DATAPP  00218
      IF(PRSL)        WRITE (NT6,9566)                                  DATAPP  00219
      IF(PRCM)        WRITE (NT6,9567)                                  BCSFRB  00005
      IF(PRDCP)       WRITE (NT6,9542)                                  DATAPP  00220
      IF(PRGNAC)      WRITE (NT6,9543)                                  DATAPP  00221
      IF(PRGNAF)      WRITE (NT6,9564)                                  DATAPP  00222
      IF(WTBL)        WRITE (NT6,9562)                                  DATAPP  00223
      IF(WTGNAF)      WRITE (NT6,9561)                                  DATAPP  00224
      IF(PRVGEOM)     WRITE (NT6,9531)                                  DATAPP  00225
      IF(PRVMODE)     WRITE (NT6,9532)                                  DATAPP  00226
      IF(MTYPEW.EQ.1)WRITE (NT6,9533)                                   DATAPP  00227
      IF(MTYPEW.EQ.2)WRITE (NT6,9534)                                   DATAPP  00228
      IF(MTYPEW.EQ.3)WRITE (NT6,9535)                                   DATAPP  00229
      IF(NSURF.EQ.1) GO TO 650                                          DATAPP  00230
      IF(MTYPET.EQ.1)WRITE (NT6,9536)                                   DATAPP  00231
      IF(MTYPET.EQ.2)WRITE (NT6,9537)                                   DATAPP  00232
      IF(MTYPET.EQ.3)WRITE (NT6,9538)                                   DATAPP  00233
  650 CONTINUE                                                          DATAPP  00234
      IF(DIHW)        WRITE (NT6,9539)                                  DATAPP  00235
      IF (NSURF.EQ.1) GO TO 680                                         DATAPP  00236
      IF(DIHT)        WRITE (NT6,9540)                                  DATAPP  00237
  680 CONTINUE                                                          DATAPP  00238
      ERR = 0.01                                                        DATAPP  00239
      IF(EXAIC) ERR = 0.0001                                            DATAPP  00240
C                                                                       DATAPP  00241
C         THIS SET OF VARIABLES ARE DIMENSION SIZES FOR ARRAYS.         DATAPP  00242
C         THE NUMBER IS THE DIMENSION OF THE ARRAY.                     DATAPP  00243
C         FOR DOUBLE DIMENSIONED ARRAYS IT IS THE LARGEST NUMBER,       DATAPP  00244
C         NOT THE PRODUCT OF THE TWO DIMENSIONS.                        DATAPP  00245
C                                                                       DATAPP  00246
      KKERNL = 1                                                        DATAPP  00247
      LKERNL = 1640                                                     DATAPP  00248
      LBXCDW = 150                                                      DATAPP  00249
      LBXCDT =  90                                                      DATAPP  00250
      LBOXC  =   8                                                      DATAPP  00251
      LJALPH =200                                                       DATAPP  00252
      LPNTRM = 100                                                      DATAPP  00253
      LNODES = 1000                                                     DATAPP  00254
      LPNTSD =90                                                        DATAPP  00255
      LSDW   =600                                                       DATAPP  00256
      LPNTDW = 100                                                      DATAPP  00257
      LDW = 1275                                                        DATAPP  00258
      LYVP   =250                                                       DATAPP  00259
C                                                                       DATAPP  00260
      WRITE (NT6,6001)                                                  DATAPP  00261
      WRITE (NT6,6002) OAIC,NAIC,OSAIC,NSAIC,INTAPE,INFSP,NOUTP,IOUFSP  DATAPP  00262
C                                                                       DATAPP  00263
 6001 FORMAT(1H0/45X, 39HTHE FOLLOWING TAPE SETUP IS REQUESTED - /)     DATAPP  00264
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 6002 FORMAT(51X,*OLD AIC TAPE =*,I3,/51X,*NEW AIC TAPE =*,I3,/          DATAPP  00265
     1 51X,*OLD SPATIAL AIC TAPE =*,I3,/51X,*NEW SPATIAL AIC TAPE =*,I3, DATAPP  00266
     2 / 51X,*INPUT DATA TAPE =*,I3,*  SPACED*,I3,* FILES,*              DATAPP  00267
     3 / 51X,*OUTPUT TAPE     =*,I3,*  SPACED*,I3,* FILES,* //)          DATAPP  00268
C                                                                        DATAPP  00269
C         PRINT THE XKVAL OR XKS ARRAY.                                  DATAPP  00270
C                                                                        DATAPP  00271
      IF(XK1(1).EQ.-1.0) GO TO 700                                       DATAPP  00272
      WRITE(NT6,6003)                                                    DATAPP  00273
      WRITE(NT6,6004) (XK1(I),I=1,NKVALS)                                DATAPP  00274
      GO TO 900                                                          DATAPP  00275
C                                                                        DATAPP  00276
  700 CONTINUE                                                           DATAPP  00277
      IF(XKS(1).EQ.-1.0) GO TO 800                                       DATAPP  00278
      WRITE(NT6,6005)                                                    DATAPP  00279
      WRITE(NT6,6004) (XKS(I),I=1,NKVALS)                                DATAPP  00280
      GO TO 900                                                          DATAPP  00281
C                                                                        DATAPP  00282
  800 CONTINUE                                                           DATAPP  00283
      WRITE(NT6,6006)                                                    DATAPP  00284
C                                                                        DATAPP  00285
  900 CONTINUE                                                           DATAPP  00286
C                                                                        DATAPP  00287
 6003 FORMAT(1HO,29X, *THE FOLLOWING IS THE REDUCED FREQUENCY ARRAY BASE DATAPP  00288
     1D ON BOX LENGTH* /)                                                DATAPP  00289
 6005 FORMAT(1HO,29X, *THE FOLLOWING IS THE REDUCED FREQUENCY ARRAY BASE DATAPP  00290
     1D ON WING SEMI-SPAN* /)                                            DATAPP  00291
 6004 FORMAT(1H / (31X,6F11.5)  )                                        DATAPP  00292
 6006 FORMAT(49HO*** WARNING -- NO REDUCED FREQUENCIES SPECIFIED.        DATAPP  00293
     1    51H  PROGRAM WILL TERMINATE AFTER GEOMETRY SECTION *** )       DATAPP  00294
C                                                                        DATAPP  00295
C                                                                        DATAPP  00296
 1000 RETURN                                                             DATAPP  00297
 9900 FORMAT(1H1,29X,58(1H*),/30X,1H*,56X,1H*,/30X,58H*      UNSTEADY AE DATAPP  00299
     1RODYNAMICS OF WING-HORIZONTAL TAIL     *,/30X,1H*,12X,*CONFIGURATI DATAPP  00300
     2ONS IN SUPERSONIC FLOW*11X,1H*,/30X,1H*,56X,1H*,/30X,58H*     PREP DATAPP  00301
     3ARED UNDER CONTRACT NO. AF 33615-70-C-1126     *,/30X,1H*,20X,*PRO DATAPP  00302
     4JECT NO. 1370*, 20X,1H*,/30X,1H*,56X,1H*  )                        DATAPP  00303
 9901 FORMAT(30X,1H*,5X,*FOR  DEPARTMENT OF THE AIR FORCE*,19X,1H*, /    DATAPP  00304
     1 30X,1H*,10X,*AERONAUTICAL SYSTEMS DIVISION*, 17X,1H*, /           DATAPP  00305
     2 30X,1H*,10X,*AIR FORCE FLIGHT DYNAMICS LABORATORY*,10X,1H*, /     DATAPP  00306
     3 30X,1H*,10X,*WRIGHT-PATTERSON AIR FORCE BASE*,15X,1H*, /          DATAPP  00307
     4 30X,1H*,56X,1H*, /                                                DATAPP  00308
     5 30X,1H*,5X,*BY   THE BOEING COMPANY*,28X,1H*, /                   DATAPP  00309
     6 30X,1H*,10X,*COMMERCIAL AIRPLANE DIVISION*,18X,1H*, /             DATAPP  00310
     7 30X,1H*,10X,*SEATTLE, WASHINGTON*, 27X,1H*, /                     DATAPP  00311
     8 30X,1H*,56X,1H*,/ 30X,58(1H*),/ )                                 DATAPP  00312
 9041 FORMAT(72HO*** WARNING -- NO OUTPUT TAPE WAS REQUESTED FOR GENERAL DATAPP  00313
     1IZED FORCES. *** )                                                 DATAPP  00314
 9042 FORMAT(63HO*** WARNING -- NO OUTPUT TAPE WAS REQUESTED FOR BOX LIF DATAPP  00315
     1TS. *** )                                                          DATAPP  00316
 9043 FORMAT(54HO*** WARNING -- ORDER FOR VELOCITY POTENTIAL SMOOTHING   DATAPP  00317
     1    36H TOO LARGE.  IT HAS BEEN REDUCED TO ,I2, 4H ***)            DATAPP  00318
 9551 FORMAT(1HO,5X,7HTITLE -,13X,8A10,13X,7H- TITLE /1HO/45X,           DATAPP  00319
     1    37HTHE FOLLOWING OPTIONS ARE REQUESTED - / )                   DATAPP  00320
 9531 FORMAT(51X,*GEOMETRY FROM PREVIOUS CYCLE* )                        DATAPP  00321
 9532 FORMAT(51X,*MODE SHAPES FROM PREVIOUS CYCLE* )                     DATAPP  00322
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9533 FORMAT(51X,*MODAL INPUT FOR WING IS POLYNOMIAL COEFFICIENTS* )      DATAPP  00323
9534 FORMAT(51X,*MODAL INPUT FOR WING IS ARBITRARY LOCATIONS FOR SURFAC DATAPP  00324
    1E FITTING * )                                                     DATAPP  00325
9535 FORMAT(51X,*MODAL INPUT FOR WING IS BOX CENTER VALUES* )           DATAPP  00326
9536 FORMAT(51X,*MODAL INPUT FOR TAIL IS POLYNOMIAL COEFFICIENTS* )     DATAPP  00327
9537 FORMAT(51X,*MODAL INPUT FOR TAIL IS ARBITRARY LOCATIONS FOR SURFAC DATAPP  00328
    1E FITTING * )                                                     DATAPP  00329
9538 FORMAT(51X,*MODAL INPUT FOR TAIL IS BOX CENTER VALUES* )          DATAPP  00330
9539 FORMAT(51X,*DIHEDRAL WING INFLUENCE CALCULATED* )                 DATAPP  00331
9540 FORMAT(51X,*DIHEDRAL TAIL INFLUENCE CALCULATED* )                 DATAPP  00332
9542 FORMAT(51X,*PRINT PRESSURE DIFFERENCE COEFFICIENTS* )             DATAPP  00333
9543 FORMAT(51X,*PRINT GENERALIZED AERODYNAMIC COEFFICIENTS* )         DATAPP  00334
9544 FORMAT(51X,*PRINT LONGITUDINAL WASHES ALONG SAMPLING CHORDS*)     DATAPP  00335
9545 FORMAT(51X,*PRINT NORMAL WASHES* )                                DATAPP  00336
9546 FORMAT(51X,*EFFECTIVE SUBDIVIDED AREA OF*,I3,* ROWS REQUESTED* )  DATAPP  00337
9552 FORMAT(51X,*SYMMETRIC ANALYSIS*)                                  DATAPP  00338
9553 FORMAT(51X,*ANTI-SYMMETRIC ANALYSIS*)                             DATAPP  00339
9554 FORMAT(51X,*PLYWOOD OPTION IS USED. (PLANFORM BOUNDARY DETERMINED  DATAPP  00340
    1BY BOX PATTERN.) *)                                               DATAPP  00341
9556 FORMAT(51X,*SINGLE PLANFORM ANALYSIS*)                            DATAPP  00342
9557 FORMAT(51X,*ANALYSIS FOR 2 PLANFORMS*)                            DATAPP  00343
9558 FORMAT(1HO,100(1H$)///*  THE SPRUCE GOOSE IS LOOSE * //1HO,       DATAPP  00344
    1       100(1H$) )                                                 DATAPP  00345
9561 FORMAT(51X,*WRITE GENERALIZED AIR FORCES ON TAPE*)                DATAPP  00346
9562 FORMAT(51X,*WRITE BOX LIFTS ON TAPE*)                             DATAPP  00347
9564 FORMAT(51X,*PRINT GENERALIZED AIR FORCES*)                        DATAPP  00348
9565 FORMAT(51X,*PRINT THE BOX LIFTS*)                                 DATAPP  00349
9566 FORMAT(51X,*PRINT THE SECTION LIFTS*)                             DATAPP  00350
9567 FORMAT(51X,*SECTION MOMENTS WILL BE COMPUTED WITH MODE SHAPE ONE*/ BCSFRB  00006
    1 51X,* ASSUMED FOR THE PITCH MODE.*   )                           BCSFRB  00007
9568 FORMAT(51X,*PRINT MODE SHAPES USED*)                              DATAPP  00351
9569 FORMAT(51X,*PRINT THE BOX PATTERN*)                               DATAPP  00352
9570 FORMAT(51X,*PRINT THE UPWASHES ALONG SAMPLING CHORDS*)            DATAPP  00353
9571 FORMAT(51X,*PRINT THE VELOCITY POTENTIALS*)                       DATAPP  00354
9572 FORMAT(51X,*BASIC (UNSUBDIVIDED) ANALYSIS WILL BE USED* )         DATAPP  00355
9573 FORMAT(51X,*SUBDIVISION WILL BE APPLIED*)                         DATAPP  00356
9575 FORMAT(51X,*ALL PARAMETERS SET TO DEFAULT VALUES*)                DATAPP  00357
9576 FORMAT(51X,*APPROXIMATE KERNELS WILL BE USED*)                    DATAPP  00358
9577 FORMAT(51X,*EXACT KERNELS WILL BE USED*)                          DATAPP  00359
9578 FORMAT(51X,*PRINT THE SIDEWASHES ALONG SAMPLING CHORDS*)          DATAPP  00360
9580 FORMAT(51X,*MACH NUMBER = *, F8.6)                                DATAPP  00361
9581 FORMAT(51X,*VELOCITY POTENTIALS WILL BE SMOOTHED BY A LEAST-SQUA*, DATAPP  00362
    1       *RES* / 61X,*POLYNOMIAL SURFACE FIT, OF ORDER*,I2,1H./     DATAPP  00363
    2     61X,*(0 = PROGRAM DETERMINED.) * ;                           DATAPP  00364
9582 FORMAT(51X,*PRINT MODE SHAPE POLYNOMIAL COEFFICIENTS, IF AVAILAB*, DATAPP  00365
    1       *LE * )                                                    DATAPP  00366
9583 FORMAT(51X,*PRINT THE PLANAR AIC ARRAYS USED * )                  DATAPP  00367
9584 FORMAT(51X,*PRINT THE SPATIAL AIC ARRAYS USED * )                 DATAPP  00368
9585 FORMAT(51X,*VELOCITY POTENTIALS WILL BE SMOOTHED BY A LEAST SQUA*, DATAPP  00369
    1       *RES* / 61X,*POLYNOMIAL CHORDWISE FIT, OF ORDER*,I2,1H./   DATAPP  00370
    2     61X,*(0 = PROGRAM DETERMINED.) * )                           DATAPP  00371
     END                                                               DATAPP  00372
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      OVERLAY (AFMBOX,1,2)                                                  GEOMBX  00002
      PROGRAM GEOMBX                                                        GEOMBX  00003
C         THIS OVERLAY READS ALL GEOMETRIC INFORMATION (CARDS G TO L, OR    GEOMBX  00004
C         FROM TAPE) AND COMPUTES THE INTERNAL GEOMETRY NEEDED              GEOMBX  00005
C              ERRORS IN GEOMETRIC DEFINITIONS ARE CAUGHT                   GEOMBX  00006
C              ALL GEOMETRY IS NON-DIMENSIONALIZED BY BOX WIDTH (LENGTH)    GEOMBX  00007
C              BOX CODES ARE DEFINED -                                      GEOMBX  00008
C                  0 = NOT USED                                             GEOMBX  00009
C                  1 = ON-PLANFORM                                          GEOMBX  00010
C                  2 = DIAPHRAGM                                            GEOMBX  00011
C                  3 = WAKE                                                 GEOMBX  00012
C              ALPHA ARRAY, FRACTIONAL PART OF EDGE BOXES, IS COMPUTED      GEOMBX  00013
C              MAXIMUM PLANAR AIC ARRAY SIZE IS DETERMINED                  GEOMBX  00014
C              FOR EACH CHORD REQUIRING A SPATIAL AIC ARRAY, DETERMINE      GEOMBX  00015
C                   WHICH AIC ARRAY TO USE (KPTWW, KPTTT,KPTWRT,DPTWLT)     GEOMBX  00016
C                   EL, THE VERTICAL DISTANCE SEPARATING THE SURFACES       GEOMBX  00017
C                   YBAR, THE HORIZONTAL OFFSET                             GEOMBX  00018
C                   MUAIC ARRAY, A MAP OF NEEDED AIC VALUES                 GEOMBX  00019
C                                                                           GEOMBX  00020
      COMMON /CONTRL/ PREVEX,CMACH, TITLE(8), PRVGEOM,PRVMODE,DIHW,DIHT,    CONTRL  00002
     1                DEFAULT                                              CONTRL  00003
      LOGICAL     PRVGEOM,PRVMODE,DIHW,DIHT,DEFAULT                         CONTRL  00004
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,        PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                                  PROBLM  00003
      LOGICAL         SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                     PROBLM  00004
      COMMON /KVAL  / IKVAL,XKVAL(20), XKS(20)                            KVAL    00002
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,             GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,                 GEOMTY  00003
     2                MXBW,MYBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,            GEOMTY  00004
     3                IXBW,XCENTR                                          GEOMTY  00005
      LOGICAL COPLAN                                                        GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,MXBT,MYBT,MYBBT,MXBST,MYBST,          GEOM2   00002
     1                MYBBST,IXBT,IXBST,CAPL                               GEOM2   00003
      COMMON / KERN / ERR,MXSKRN,IPKERN,NPLKRN,NSPATK,NROWEA                KERN    00002
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,             FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC             FILES   00003
      COMMON /IOCONT/ OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,          IOCONT  00002
     1                PRPAIC,PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,          IOCONT  00003
     2                PRBL,PRDCP,PRGNAF,PRGNAC,PRSL,PRLW,PRNW,PRCM         BCSFRB  00001
      EQUIVALENCE (PRUW,PRDW)                                               IOCONT  00005
      LOGICAL    OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,PRPAIC,        IOCONT  00006
     1           PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,PRBL,PRSL,PRGNAF,     IOCONT  00007
     2           PRDCP,PRGNAC,PRUW,PRLW,PRNW,PRCM                          BCSFRB  00002
      COMMON /TAPEIO/ NFS,NMS,LS,NMR,ID(20),NID,ITYPE,LRS,LWS,M,N,          TAPEIO  00002
     1                PARM(10),IRR                                         TAPEIO  00003
      DIMENSION IPARM(10)                                                   TAPEIO  00004
      EQUIVALENCE (PARM,IPARM)                                              TAPEIO  00005
      COMMON / MODES/ SYM,SYMT,MTYPEW,MTYPET                                MODCOM  00002
      COMMON /ARRAYS/ KBXCDW,LBXCDW,LBOXC,KBXCDT,LBXCDT,KJALPH,LJALPH,      ARRAYS  00002
     1                KALPHA,KKERNL,LKERNL,KPNTRM,LPNTRM,KDEFSL,KELPHI,     ARRAYS  00003
     2                LMODES,KPNTSD,LPNTSD,KSDW,LSDW,KPNTDW,LPNTDW,         ARRAYS  00004
     3                KDW,LDW,KTVP,LTVP                                     ARRAYS  00005
      COMMON /SAMPLW/ ISMPLW,ICHORD(10),IBOXF(10),IBOXL(10),ZLOC(10)        SAMPLW  00002
      COMMON /MUAICS/ YBAR,EL,MUAIC(2,50),NROWS,SURF,                       MUAICS  00002
     1                YBARL,ELL, MUAICL(2,50),NROWSL,SURFL,PSIDIF          MUAICS  00003
      LOGICAL SURF,SURFL                                                    MUAICS  00004
      COMMON /EDGES / FEXLOC(250), TEXLOC(250),JDIAG                        EDGES   00002
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      COMMON /PLANXY/ NWLE,NWTE,NTLE,NTTE, XWLE(10),YWLE(10),          PLANXY  00002
     1                XWTE(10),YWTE(10), XTLE(10),YTLE(10),           PLANXY  00003
     2                XTTE(10),YTTE(10)                               PLANXY  00004
      LOGICAL MXWRIT,RANDOU, MXREAD,RANDIN                            GEOMBX  00036
      COMMON /CHECKPR/ DPPCPR,GEOCPR,MODCPR,AICCPR,NWSCPR,SMCPR,GAFCPR CHECKPR 00002
      LOGICAL  DPPCPR, GEOCPR, MODCPR, AICCPR,NWSCPR,  SMCPR, GAFCPR  CHECKPR 00003
      EQUIVALENCE (CHECKPR,GEOCPR)                                    GEOMBX  00039
      LOGICAL CHECKPR                                                 GEOMBX  00040
C                                                                     GEOMBX  00042
C                                                                     GEOMBX  00051
      DIMENSION IBOXW(150,8),IBOXT(90,8),                             GEOMBX  00052
     1    IWAKE(160), ICODE(160)                                      GEOMBX  00053
      DIMENSION KPTWW(50),KPTTT(50),KPTLWT(50),KPTRWT(50)             GEOMBX  00054
      DIMENSION ALPHA(200), IJALPH(200)                               GEOMBX  00055
      DIMENSION KPT(4,50)                                             GEOMBX  00056
      EQUIVALENCE (KPT,ALPHA)                                         GEOMBX  00057
      DATA  MXWRIT,RANDOU,MXREAD,RANDIN / 4*.F. /                     FTNX1   00008
      DATA  NBWRD  /20/                                               FTNX1   00009
      DATA  INIT,XINIT / 377670B,  376543217777777777777B/            GEOMBX  00058
      DATA  EPS  / 1.0E-4 /                                           GEOMBX  00059
C                                                                     FTNX1   00010
C        NAMELIST PARAMETERS  FOR CARDS TO BE READ IN THIS SECTION    FTNX1   00011
      NAMELIST /CARDF / WLAX,WLAZ,PSIW,  TLAX,TLAZ, PSIT,    CHECKPR  FTNX1   00012
     1         /CARDG / NCHRDS, XCENTR, XEDGE, ICHORD,IBOXF,IBOXL,ZLOC FTNX1   00013
C              CARDH   NWLE, NWTE, NTLE, NTTE    (4I5)                FTNX1   00014
C              CARDS I TO L   (6E10.0)                                 FTNX1   00015
C                                                                     FTNX1   00016
 9001 FORMAT(4I5)                                                     FTNX1   00017
 9002 FORMAT(6E10.0)                                                  FTNX1   00018
C                                                                     FTNX1   00019
C                                                                     GEOMBX  00060
      LSCHDS = LBOXC * 20                                             GEOMBX  00061
      XSUBDV = NSUBDV                                                 GEOMBX  00062
      NSUBD2 = NSUBDV/2                                               GEOMBX  00063
      NSUBCN = NSUBD2 + 1                                             GEOMBX  00064
      HALFBX = XSUBDV/2.0                                             GEOMBX  00065
C                                                                     GEOMBX  00066
C        IS PREVIOUS GEOMETRY TO BE USED -                            GEOMBX  00067
      IF (.NOT. PRVGEOM) GO TO 15                                     GEOMBX  00068
C        YES.  HAS THE MACH NUMBER CHANGED -                          GEOMBX  00069
      IF ( XMACH .EQ. OMACH) GO TO 2000                               GEOMBX  00070
C        YES.  SKIP THE GEOMETRY READS, BUT REDO THE REST FOR THE     GEOMBX  00071
C              NEW BOX PATTERN                                        GEOMBX  00072
      BIO = 31                                                        GEOMBX  00073
      XCNTRO = XCENTR                                                 GEOMBX  00074
      GO TO 272                                                       GEOMBX  00075
C                                                                     GEOMBX  00076
C        READ CARDS F AND G                                           GEOMBX  00077
   15 CONTINUE                                                        GEOMBX  00078
      WLAX = 0.                                                       GEOMBX  00079
      WLAZ = 0.                                                       GEOMBX  00080
      PSIW = 0.                                                       GEOMBX  00081
      TLAX = 0.                                                       GEOMBX  00082
      TLAZ = 0.                                                       GEOMBX  00083
      PSIT = 0.                                                       GEOMBX  00084
      READ (NT5,CARDF)                                                GEOMBX  00085
      WRITE (NT6,6010) WLAX,WLAZ,PSIW                                 GEOMBX  00086
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      IF (NSURF .EQ. 2) WRITE (NT6,6012) TLAX,TLAZ,PSIT                 GEOMBX  00087
      DEGREE = .01745329251943                                          GEOMBX  00088
C         CONVERT DEGREES TO RADIANS                                    GEOMBX  00089
      IVAL = 4HPSIW                                                     GEOMBX  00090
      IF (PSIW .GT. 45. .OR. PSIW .LT. -45.) GO TO 8030                 GEOMBX  00091
      PSIW = PSIW * DEGREE                                              GEOMBX  00092
      IF (NSURF .EQ. 1) GO TO 30                                        GEOMBX  00093
      IVAL = 4HPSIT                                                     GEOMBX  00094
C         SPECIAL CHECK FOR VERTICAL TAIL                               GEOMBX  00095
      IF (PSIT .EQ. 90. .AND. SYM .LE. 0) GO TO 25                      GEOMBX  00096
      IF (PSIT .GT. 45. .OR. PSIT .LT. -45.) GO TO 8030                 GEOMBX  00097
C              SYMT   = SYMMETRY INDICATOR FOR THE TAIL, IDENTICAL TO   GEOMBX  00098
C                       THE WING EXCEPT FOR A VERTICAL TAIL             GEOMBX  00099
      SYMT = SYM                                                        GEOMBX  00100
      GO TO 28                                                          GEOMBX  00101
   25 CONTINUE                                                          GEOMBX  00102
      SYMT = 0.                                                         GEOMBX  00103
   28 CONTINUE                                                          GEOMBX  00104
      PSIT = PSIT * DEGREE                                              GEOMBX  00105
C                                                                       GEOMBX  00106
   30 CONTINUE                                                          GEOMBX  00107
      NCHRDS = INIT                                                     GEOMBX  00108
      XCENTR = XINIT                                                    GEOMBX  00109
      XEDGE  = XINIT                                                    GEOMBX  00110
      DO 50 I=1,10                                                      GEOMBX  00111
      ICHORD(I) = INIT                                                  GEOMBX  00112
      IBOXF(I) = INIT                                                   GEOMBX  00113
      IBOXL(I) = INIT                                                   GEOMBX  00114
   50 ZLOC(I) = XINIT                                                   GEOMBX  00115
      READ(NT5,CARDG)                                                   GEOMBX  00116
C                                                                       GEOMBX  00117
C         CHECK AND PRINT PARAMETERS READ                               GEOMBX  00118
      WRITE (NT6,6015) NCHRDS,XCENTR, XEDGE                             GEOMBX  00119
C                                                                       GEOMBX  00120
      IVAL = 6HNCHRDS                                                   GEOMBX  00121
      IF (NCHRDS .EQ. INIT) GO TO 8010                                  GEOMBX  00122
      IF (NCHRDS .LE. 0 .OR. NCHRDS .GE. LSCHDS/NSUBDV) GO TO 8015      GEOMBX  00123
      MXBW = NCHRDS                                                     GEOMBX  00124
      IVAL = 6HXCENTR                                                   GEOMBX  00125
      IF (XCENTR .EQ. XINIT) GO TO 120                                  GEOMBX  00126
C         USE XCENTR DIRECTLY, IGNORE XEDGE                             GEOMBX  00127
      IF (XEDGE .NE. XINIT)  WRITE (NT6,9010)                           GEOMBX  00128
      GO TO 125                                                         GEOMBX  00129
C         GET XCENTR FROM XEDGE                                         GEOMBX  00130
  120 CONTINUE                                                          GEOMBX  00131
      IF (XEDGE .EQ. XINIT) GO TO 8020                                  GEOMBX  00132
  125 CONTINUE                                                          GEOMBX  00133
      IF (ISMPLW .EQ. 0) GO TO 200                                      GEOMBX  00134
      IF (NSURF .EQ. 2) GO TO 170                                       GEOMBX  00135
      DO 150 I = 1,ISMPLW                                               GEOMBX  00136
      IF (ICHORD(I) .GT. MXBW  .OR. ICHORD(I) .LE. 0) GO TO 130         GEOMBX  00137
      IF (IBOXF(I) .EQ. INIT .OR. IBOXL(I) .EQ. INIT) GO TO 140         GEOMBX  00138
      IF (IBOXF(I) .LT. 1 .OR. IBOXL(I) .GT. LBXCDW/NSUBDV) GO TO 130   GEOMBX  00139
      IF (IBOXF(I) .LE. IBOXL(I) ) GO TO 140                            GEOMBX  00140
  130 WRITE (NT6,9020) I                                                GEOMBX  00141
      ISMPLW = I - 1                                                    GEOMBX  00142
      GO TO 160                                                         GEOMBX  00143
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  140 CONTINUE                                                          GEOMBX  00144
      IF (ZLOC(I) .EQ. XINIT) ZLOC(I) = 0.                              GEOMBX  00145
  150 CONTINUE                                                          GEOMBX  00146
  160 CONTINUE                                                          GEOMBX  00147
      WRITE (NT6,6017) ISMPLW, (ICHORD(I), IBOXF(I),IBOXL(I), ZLOC(I),  GEOMBX  00148
     1    I = 1,ISMPLW )                                               GEOMBX  00149
      GO TO 200                                                         GEOMBX  00150
C         SAMPLING OF SCHWASHES ILLEGAL IF TAIL DEFINED                 GEOMBX  00151
  170 CONTINUE                                                          GEOMBX  00152
      WRITE (NT6,9030) ISMPLW                                           GEOMBX  00153
      ISMPLW = 0                                                        GEOMBX  00154
  200 CONTINUE                                                          GEOMBX  00155
C                                                                       GEOMBX  00156
C         OBTAIN THE LEADING AND TRAILING EDGE VALUES                   GEOMBX  00157
C         CARD INPUT OF PLANFORMS IS REQUIRED                           GEOMBX  00158
      READ (NT5,5001) NWLE,NWTE,NTLE,NTTE                               GEOMBX  00159
  210 WRITE(NT6,6021) NWLE,NWTE                                         GEOMBX  00160
      GO TO (214,212),NSURF                                             GEOMBX  00161
  212 WRITE(NT6,6022) NTLE,NTTE                                         GEOMBX  00162
  214 IVAL = 4HNWLE                                                     GEOMBX  00163
      IF (NWLE .LT. 2 .OR. NWLE .GT. 10) GO TO 8030                     GEOMBX  00164
      IVAL = 4HNWTE                                                     GEOMBX  00165
      IF (NWTE .LT. 2 .OR. NWTE .GT. 10) GO TO 8030                     GEOMBX  00166
      IF (NSURF .EQ. 1) GO TO 220                                       GEOMBX  00167
      IVAL = 4HNTLE                                                     GEOMBX  00168
      IF (NTLE .LT. 2 .OR. NTLE .GT. 10) GO TO 8030                     GEOMBX  00169
      IVAL = 4HNTTE                                                     GEOMBX  00170
      IF (NTTE .LT. 2 .OR. NTTE .GT. 10) GO TO 8030                     GEOMBX  00171
  220 CONTINUE                                                          GEOMBX  00172
C                                                                       GEOMBX  00173
C         CARDS I AND J - WING DEFINITION POINTS                        GEOMBX  00174
      WRITE (NT6,6029)                                                  GEOMBX  00175
      IVAL = 9HWING L.E.                                                GEOMBX  00176
      READ (NT5,5002) (XWLE(I),YWLE(I),I=1,NWLE)                        GEOMBX  00177
      WRITE (NT6,6030) IVAL,(XWLE(I),YWLE(I),I=1,NWLE)                  GEOMBX  00178
      CALL EDGCHK(XWLE,YWLE,NWLE,1,IRR)                                 GEOMBX  00179
      IF (IRR .NE. 0) GO TO 8050                                        GEOMBX  00180
      IVAL = 9HWING T.E.                                                GEOMBX  00181
      READ (NT5,5002) (XWTE(I),YWTE(I),I=1,NWTE)                        GEOMBX  00182
      WRITE (NT6,6030) IVAL,(XWTE(I),YWTE(I),I=1,NWTE)                  GEOMBX  00183
      CALL EDGCHK(XWTE,YWTE,NWTE,2,IRR)                                 GEOMBX  00184
      IF (IRR .NE. 0) GO TO 8050                                        GEOMBX  00185
      IF (NSURF .EQ. 1) GO TO 270                                       GEOMBX  00186
C                                                                       GEOMBX  00187
C         CARDS K AND L - TAIL DEFINITION POINTS                        GEOMBX  00188
      IVAL = 9HTAIL L.E.                                                GEOMBX  00189
      READ (NT5,5002) (XTLE(I),YTLE(I),I=1,NTLE)                        GEOMBX  00190
      WRITE (NT6,6030) IVAL,(XTLE(I),YTLE(I),I=1,NTLE)                  GEOMBX  00191
      CALL  EDGCHK(XTLE,YTLE,NTLE,1,IRR)                                GEOMBX  00192
      IF (IRR .NE. 0) GO TO 8050                                        GEOMBX  00193
      IVAL = 9HTAIL T.E.                                                GEOMBX  00194
      READ (NT5,5002) (XTTE(I),YTTE(I),I=1,NTTE)                        GEOMBX  00195
      WRITE (NT6,6030) IVAL, (XTTE(I),YTTE(I),I=1,NTTE)                 GEOMBX  00196
      CALL EDGCHK(XTTE,YTTE,NTTE,2,IRR)                                 GEOMBX  00197
      IF (IRR .NE. 0) GO TO 8050                                        GEOMBX  00198
      GO TO 270                                                         GEOMBX  00199
C                                                                       GEOMBX  00200
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C         PLANFORM DEFINITIONS TO BE READ FROM TAPE                    GEOMBX  00201
  230 CONTINUE                                                         GEOMBX  00202
C                                                                      GEOMBX  00203
  270 CONTINUE                                                         GEOMBX  00204
      B1BETA = YWLE(NWLE)/HYBW                                         GEOMBX  00205
  272 CONTINUE                                                         GEOMBX  00206
      B1   =  B1BETA * SQRT(XMACH*XMACH-1.0)                           GEOMBX  00207
      B1BTA2 = B1BETA* 0.5                                             GEOMBX  00208
      B12  =  B1 * 0.5                                                 GEOMBX  00209
      IF (NSUBDV .NE. 1) GO TO 275                                     GEOMBX  00210
      B1S  = B1                                                        GEOMBX  00211
      B1BTAS = B1BETA                                                  GEOMBX  00212
      GO TO 280                                                        GEOMBX  00213
  275 B1S  = B1/XSUBDV                                                 GEOMBX  00214
      B1BTAS = B1BETA/XSUBDV                                           GEOMBX  00215
  280 CONTINUE                                                         GEOMBX  00216
      WRITE (NT6,6040) B1,B1BETA                                       GEOMBX  00217
C                                                                      GEOMBX  00218
C         SET THE XKVAL ARRAY IF XKS WAS INPUT                         GEOMBX  00219
C                                                                      GEOMBX  00220
      IF(XKS(1).EQ.-1.0) GO TO 295                                     GEOMBX  00221
      DO 290 I=1,NKVALS                                                GEOMBX  00222
      XKVAL(I) = XKS(I) * (B1/YWLE(NWLE))                              GEOMBX  00223
  290 CONTINUE                                                         GEOMBX  00224
  295 CONTINUE                                                         GEOMBX  00225
C                                                                      GEOMBX  00226
C         DETERMINE THE GLOBAL COORDINATE LOCATION OF THE FIRST UN-    GEOMBX  00227
C         SUBDIVIDED PLANFORM BOX CENTER, XCENTR                       GEOMBX  00228
      IVAL = 6HXCENTR                                                  GEOMBX  00229
      IF (XCENTR .EQ. XINIT) XCENTR = XEDGE + B12                      GEOMBX  00230
      XEDGEW = XWLE(1) + (XWLE(2)-XWLE(1)) * B1BTA2 /  YWLE(2)         GEOMBX  00231
      IF (PRVGEOM) XEDGEW = B10* XWLE(1) - B10 + XCNTRO  +             GEOMBX  00232
     1     B10 *(XWLE(2) - XWLE(1)) * .5 /(YWLE(2) - .5)               GEOMBX  00233
      IF (XCENTR-XEDGEW) 310,330,320                                   GEOMBX  00234
  310 DO 315 I = 1,51                                                  GEOMBX  00235
      XCENTR = XCENTR + B1                                             GEOMBX  00236
      IF (XCENTR .GE. XEDGEW) GO TO 330                                GEOMBX  00237
  315 CONTINUE                                                         GEOMBX  00238
      GO TO 8060                                                       GEOMBX  00239
  320 DO 325 I = 1,51                                                  GEOMBX  00240
      IF (XCENTR-B1 .LT. XEDGEW) GO TO 330                             GEOMBX  00241
      XCENTR = XCENTR - B1                                             GEOMBX  00242
  325 CONTINUE                                                         GEOMBX  00243
      GO TO 8060                                                       GEOMBX  00244
  330 CONTINUE                                                         GEOMBX  00245
C         IS PREVIOUS GEOMETRY BEGIN USED -                            GEOMBX  00246
      IF (.NOT. PRVGEOM) GO TO 355                                     GEOMBX  00247
C                                                                      GEOMBX  00248
C         YES.  CONVERT X-COORDINATE VALUES TO NEW BOX LENGTH          GEOMBX  00249
      PSIDIF = PSIT - PSIW                                             GEOMBX  00250
      SLIDE =  -B10 + XCNTRO - XCENTR                                  GEOMBX  00251
      DO 335 I = 1,NWLE                                                GEOMBX  00252
  335 XWLE(I) = (B10*XWLE(I) + SLIDE)/B1 + 1.0                         GEOMBX  00253
      DO 340 I = 1,NWTE                                                GEOMBX  00254
  340 XWTE(I) = (B10*XWTE(I) + SLIDE)/B1 + 1.0                         GEOMBX  00255
      IF (NSURF .EQ. 1) GO TO 390                                      GEOMBX  00256
      DO 345 I = 1,NTLE                                                GEOMBX  00257
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  345 XTLE(I) = (B1O*XTLE(I) + SLIDE)/B1 + 1.0                          GEOMBX  00258
      DO 350 I = 1,NTTE                                                 GEOMBX  00259
  350 XTTE(I) = (B1O*XTTE(I) + SLIDE)/B1 + 1.0                          GEOMBX  00260
      GO TO 390                                                         GEOMBX  00261
C                                                                       GEOMBX  00262
C         CONVERT GEOMETRIC INFORMATION TO THE NON-DIMENSIONAL          GEOMBX  00263
C         NC, MC, LC COORDINATE SYSTEM                                  GEOMBX  00264
  365 CONTINUE                                                          GEOMBX  00265
      DO 360 I = 1,NWLE                                                 GEOMBX  00266
      XWLE(I) = (XWLE(I)-XCENTR)/B1 + 1.0                               GEOMBX  00267
  360 YWLE(I) =  YWLE(I)/B1BETA     + 0.5                               GEOMBX  00268
      DO 365 I = 1,NWTE                                                 GEOMBX  00269
      XWTE(I) = (XWTE(I)-XCENTR)/B1 + 1.0                               GEOMBX  00270
  365 YWTE(I) =  YWTE(I)/B1BETA     + 0.5                               GEOMBX  00271
      GO TO (370,375),NSURF                                             GEOMBX  00272
  370 CAPL = 0.                                                         GEOMBX  00273
      PSIT = 0.                                                         GEOMBX  00274
      PSIDIF = -PSIW                                                    GEOMBX  00275
      NWBT  = 0                                                         GEOMBX  00276
      NWBBT = 0                                                         GEOMBX  00277
      NWBST = 0                                                         GEOMBX  00278
      NWBBST = 0                                                        GEOMBX  00279
      IF (ISMPLW .EQ. 0) GO TO 390                                      GEOMBX  00280
C         TRANSFORM ZLOC FOR THE SAMPLE WASH CHORDS TO A NON-DIMENSIONAL GEOMBX  00281
C         UNROTATED LC COORDINATE HAVING ITS ZERO ON THE WING CENTER    GEOMBX  00282
C         LINE                                                          GEOMBX  00283
      DO 372 I = 1,ISMPLW                                               GEOMBX  00284
      ZLOC(I)  = (ZLOC(I) - WLAZ) /B1BETA                               GEOMBX  00285
  372 CONTINUE                                                          GEOMBX  00286
      GO TO 390                                                         GEOMBX  00287
  375 XDIFF = WLAX + XCENTR - TLAX                                      GEOMBX  00288
      DO 380 I = 1,NTLE                                                 GEOMBX  00289
      XTLE(I) = (XTLE(I)-XDIFF)/B1 + 1.0                                GEOMBX  00290
  380 YTLE(I) =  YTLE(I)/B1BETA  + 0.5                                  GEOMBX  00291
      DO 385 I = 1,NTTE                                                 GEOMBX  00292
      XTTE(I) = (XTTE(I)-XDIFF)/B1 + 1.0                                GEOMBX  00293
  385 YTTE(I) =  YTTE(I)/B1BETA  + 0.5                                  GEOMBX  00294
      CAPL  =  (TLAZ-WLAZ)/B1BETA                                       GEOMBX  00295
      PSIDIF = PSIT - PSIW                                              GEOMBX  00296
C                                                                       GEOMBX  00297
C         CHECK FOR TAIL CROSSING WING                                  GEOMBX  00298
      IF (PSIDIF) 386,389,387                                           GEOMBX  00299
  386 IF (CAPL .LE. 0) GO TO 389                                        GEOMBX  00300
      GO TO 388                                                         GEOMBX  00301
  387 IF (CAPL .GE. 0) GO TO 389                                        GEOMBX  00302
  388 YCROSS = CAPL/(SIN(PSIW)-SIN(PSIT)) + .5                          GEOMBX  00303
      IF (YWLE(NWLE)*COS(PSIW) .LT. YCROSS) GO TO 390                   GEOMBX  00304
      IF (YTLE(NTLE)*COS(PSIT) .GE. YCROSS) GO TO 8080                  GEOMBX  00305
      GO TO 390                                                         GEOMBX  00306
  389 YCROSS = .5                                                       GEOMBX  00307
C                                                                       GEOMBX  00308
C         ZERO OUT THE BOX CODE ARRAYS                                  GEOMBX  00309
  390 CONTINUE                                                          GEOMBX  00310
      DO 430 J = 1,LBOXC                                                GEOMBX  00311
      DO 420 I = 1,LBXCDW                                               GEOMBX  00312
  420 IBOXW(I,J) = 0                                                    GEOMBX  00313
      DO 430 I = 1,LBXCDT                                               GEOMBX  00314
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  43  IBOXT(I,J) = 0                                                    GEOMBX  00315
C                                                                       GEOMBX  00316
C       GET THE (SUBDIVIDED) BOX CODE ARRAY FOR THE ON-PLANFORM WING    GEOMBX  00317
C       BOXES                                                           GEOMBX  00318
      IXBW = 0                                                          GEOMBX  00319
      IXBT = 0                                                          GEOMBX  00320
      IXBST = 0                                                         GEOMBX  00321
      MXBT = 0                                                          GEOMBX  00322
C                                                                       GEOMBX  00323
      CALL BXCDPF( XMLE,YMLE,NMLE,XMTE,YMTE,NMTE, LBXCDW,IBOXW)         GEOMBX  00324
C       RETURNS-  IBOXW ,  ONES FOR ON PLANFORM BOXES                   GEOMBX  00325
C                 IXBW  = LOCATION OF FIRST UNSUBDIVIDED BOX CENTER     GEOMBX  00326
C                 MXBSW = NUMBER OF SUBDIVIDED ROWS ON THE WING         GEOMBX  00327
C                 MYBSW = NUMBER OF SUBDIVIDED CHORDS ON THE WING       GEOMBX  00328
C                 MXBW  = NUMBER OF UNSUBDIVIDED ROWS                   GEOMBX  00329
C                 MYBW  = NUMBER OF UNSUBDIVIDED CHORDS                 GEOMBX  00330
C                 FEXLOC = ARRAY OF LEADING EDGE LOCATIONS              GEOMBX  00331
C                 TEXLOC = ARRAY OF TRAILING EDGE LOCATIONS             GEOMBX  00332
C                                                                       GEOMBX  00333
      MYBBSW = MYBSW                                                    GEOMBX  00334
      MXBBW = MXBW                                                      GEOMBX  00335
      MXBBSW = MXBSW                                                    GEOMBX  00336
      IF (.NOT. CHECKPR) GO TO 440                                      GEOMBX  00337
      CALL PRNTBC(IBOXW,LBXCDW, 1, MXBSW, MYBSW, .T. )                  GEOMBX  00338
      WRITE (NT6,7040) ( FEXLOC(I), I = 1,MYBSW)                        GEOMBX  00339
      WRITE (NT6,7045) (TEXLOC(I), I = 1,MYBSW)                         GEOMBX  00340
  440 CONTINUE                                                          GEOMBX  00341
C                                                                       GEOMBX  00342
C       SEARCH THE WING FOR THE FORWARD MOST DIAGONAL INTERSECTING      GEOMBX  00343
C       AN ON-PLANFORM BOX.  THIS DEFINES THE LIMIT FOR ANY TIP         GEOMBX  00344
C       DIAPHRAGM.                                                      GEOMBX  00345
C            JDIAG = THE J-LOCATION (SUBDIVIDED) OF THE DIAGONAL AT     GEOMBX  00346
C                    THE FIRST ROW OF THE PATTERN.                      GEOMBX  00347
      JDIAG = 1                                                         GEOMBX  00348
      PREV  = 0.                                                        GEOMBX  00349
      DO 530 J = 2,MYBSW                                                GEOMBX  00350
      PREV = PREV + 1.0                                                 GEOMBX  00351
      IF (FEXLOC(J) .GT. PREV) GO TO 530                                GEOMBX  00352
      PREV = FLOAT(IFIX(FEXLOC(J)))                                     GEOMBX  00353
      JDIAG = J - PREV                                                  GEOMBX  00354
  530 CONTINUE                                                          GEOMBX  00355
C                                                                       GEOMBX  00356
C       INITIALIZE THE IWAKE ARRAY                                      GEOMBX  00357
      DO 540 J = 1,MYBSW                                                GEOMBX  00358
      IWAKE(J) = TEXLOC(J)                                              GEOMBX  00359
  540 CONTINUE                                                          GEOMBX  00360
      IF (MYBSW .EQ. LSCHDS) GO TO 548                                  GEOMBX  00361
      MYBSW1 = MYBSW + 1                                                GEOMBX  00362
      DO 544 J = MYBSW1,LSCHDS                                          GEOMBX  00363
  544 IWAKE(J) = 0                                                      GEOMBX  00364
  548 CONTINUE                                                          GEOMBX  00365
      IF (NSURF .NE. 2) GO TO 705                                       GEOMBX  00366
C       THERE ARE 2 SURFACES.  DETERMINE THE FIRST PLANFORM BOX OF THE  GEOMBX  00367
C       SECOND SURFACE                                                  GEOMBX  00368
      YMIN = .5*(1.0 + 1.0/XSUBDV)                                      GEOMBX  00369
      DELE = (XTLE(2)-XTLE(1)) / (YTLE(2)-YTLE(1))                      GEOMBX  00370
      XMINS = XTLE(1)+ (YMIN-YTLE(1)) * DELE                            GEOMBX  00371
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      IXBST = XSUBDV*(XMINS-1.0) + IXBW + 1                                GEOMBX  00372
      IF (AINT(XMINS) .EQ. XMINS) IXBST = IXBST - 1                        GEOMBX  00373
      XMIN  = XTLE(1)+ (1.0 - YTLE(1)) * DELE                              GEOMBX  00374
      IXBT = XMIN                                                          GEOMBX  00375
      IF (FLOAT(IXBT) .EQ. XMIN) IXBT = IXBT - 1                           GEOMBX  00376
      IXBT  = NSUBDV * IXBT  + IXBW                                        GEOMBX  00377
C             IXBST  = LOCATION OF FIRST SUBDIVIDED TAIL BOX               GEOMBX  00378
C             IXBT   = LOCATION OF FIRST UNSUBDIVIDED TAIL BOX CENTER      GEOMBX  00379
      ISUBT = 2 - IXBST                                                    GEOMBX  00380
C         ISUBT = THE SUBSCRIPT FOR ARRAY IBOXT WHICH WILL KEEP TAIL       GEOMBX  00381
C                 ROWS WITHIN THE BOUNDSOF IBOXT                           GEOMBX  00382
      IF (CAPL .NE. 0) GO TO 510                                           GEOMBX  00383
      IF (PSIDIF .EQ. 0) GO TO 700                                         GEOMBX  00384
C                                                                          GEOMBX  00385
C         THE TWO SURFACES ARE NOT COPLANAR                                GEOMBX  00386
  510 CONTINUE                                                             GEOMBX  00387
      COPLAN = .F.                                                         GEOMBX  00388
C         DETERMINE THE BOX CODES FOR THE SECOND PLANFORM                  GEOMBX  00389
      CALL BXCDPF(XTLE,YTLE,NTLE, XTTE,YTTE,NTTE, LBXCDT,IBOXT(ISUBT,1))   GEOMBX  00390
C         RETURNS - IBOXT,   ONES FOR ON-PLANFORM BOXES                    GEOMBX  00391
C                   MXBST  = NUMBER OF SUBDIVIDED ROWS TO END OF TAIL      GEOMBX  00392
C                   MYBST  = NUMBER OF SUBDIVIDED CHORDS ON TAIL           GEOMBX  00393
C                   MXBT   = NUMBER OF UNSUBDIVIDED ROWS, BOTH PLANFORMS   GEOMBX  00394
C                   MYBT   = NUMBER OF UNSUBDIVIDED CHORDS ON TAIL         GEOMBX  00395
C                   FEXLOC = LEADING EDGE LOCATIONS, BOTH PLANFORMS        GEOMBX  00396
C                   TEXLOC = TRAILING EDGE LOCATIONS                       GEOMBX  00397
C                                                                          GEOMBX  00398
C         GET DIAPHRAGM VALUES FOR THE TAIL                                GEOMBX  00399
      MYBBST = MYBST                                                       GEOMBX  00400
      IF (.NOT. CHECKPR) GO TO 515                                         GEOMBX  00401
      CALL PRNTBC(IBOXT(ISUBT,1),LBXCDT,IXBST, MXBST,MYBST,.T.)            GEOMBX  00402
      II = MYBSW + 1                                                       GEOMBX  00403
      III = MYBSW + MYBST                                                  GEOMBX  00404
      WRITE (NT6,7040) (FEXLOC(I), I = II,III)                             GEOMBX  00405
      WRITE (NT6,7045) (TEXLOC(I), I = II,III)                             GEOMBX  00406
  515 CONTINUE                                                             GEOMBX  00407
      IWK = 0                                                              GEOMBX  00408
      CALL BXCDI ( IWK, LBXCDT,LSCHDS, IBOXT(ISUBT,1) )                    GEOMBX  00409
C         RETURNS - IBOXT,   CODES 2 AND 3 ADDED FOR DIAPHRAGM AND WAKE    GEOMBX  00410
C                   MYBBST = NUMBER OF SUBDIVIDED CHORDS, INCLUDING        GEOMBX  00411
C                            DIAPHRAM, FOR TAIL                            GEOMBX  00412
C                   MYBBT  = NUMBER OF UNSUBDIVIDED CHORDS                 GEOMBX  00413
C                                                                          GEOMBX  00414
      IF (.NOT. (PRBOX .OR. CHECKPR) ) GO TO 520                           GEOMBX  00415
      CALL PRNTBC(IBOXT(ISUBT,1),LBXCDT, IXBST, MXBST,MYBBST, .T.)         GEOMBX  00416
      IF (NSUBDV .EQ. 1) GO TO 520                                         GEOMBX  00417
      IFR = (IXBT - IXBW)/NSUBDV + 1                                       GEOMBX  00418
      CALL PRNTBC(IBOXT(ISUBT,1),LBXCDT, IFR, MXBT, MYBBT, .F. )           GEOMBX  00419
  520 CONTINUE                                                             GEOMBX  00420
C                                                                          GEOMBX  00421
C         THE FOLLOWING LOOP DETERMINES THE LOCUS OF MAXIMUM AFTWARD       GEOMBX  00422
C         PROJECTIONS OF THE INTERSECTIONS OF THE TAIL MACH CONES           GEOMBX  00423
C         WITH THE WING PLANE (EXTENDED).  MACH CONES FOR UNSUBDIVIDED     GEOMBX  00424
C         TAIL CHORDS ARE USED, BUT ALL ARITHMETIC IS IN THE SUBDIVIDED    GEOMBX  00425
C         COORDINATE SYSTEM.                                               GEOMBX  00426
C                                                                          GEOMBX  00427
C         LOOP ON TAIL CHORDS                                              GEOMBX  00428
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      CAPLL = CAPL                                                      GEOMBX  00429
C       (DO 660 JT = NSUBCN,MYBBST,NSUBDV )                             FTNX1   00020
      JT = NSUBCN                                                       FTNX1   00021
  525 CONTINUE                                                          FTNX1   00022
      YCT = JT - .5                                                     GEOMBX  00431
C         Y-OFFSET OF RECEIVING CHORD FROM CENTER-LINE, TAIL PLANE      GEOMBX  00432
C          GET ICT, THE I-LOCATION OF AFTMOST RECEIVING BOX ON TAIL CHRD GEOMBX  00433
C         IS THE TAIL CHORD ON-PLANFORM OR DIAPHRAGM -                  GEOMBX  00434
      IF (JT .GT. MYBST) GO TO 550                                      GEOMBX  00435
      JJ = JT + MYBSW                                                   GEOMBX  00436
      ICT =  TEXLOC(JJ) + EPS  - AMOD( TEXLOC(JJ)-IXBW, XSUBDV)         GEOMBX  00437
      GO TO 555                                                         GEOMBX  00438
  550 CONTINUE                                                          GEOMBX  00439
      ICT =  IXBT - NSUBDV                                              GEOMBX  00440
  555 CONTINUE                                                          GEOMBX  00441
      ICTP1 = ICT + NSUBDV                                              GEOMBX  00442
      IF (ICTP1 .GT. MXBST) GO TO 570                                   GEOMBX  00443
C         CHECK FOR WAKE DIAPHRAGM AFT OF TAIL CHORD                    GEOMBX  00444
      CALL DCODER( IBOXT(ISUBT,1),LBXCDT, ICTP1,JT, MXBST,JT,           GEOMBX  00445
     1    .T., ICODE)                                                   GEOMBX  00446
      II = 1                                                            GEOMBX  00447
      DO 560 I = ICTP1,MXBST,NSUBDV                                     GEOMBX  00448
      IF (ICODE(II).EQ. 0) GO TO 570                                    GEOMBX  00449
      ICT = I                                                           GEOMBX  00450
      II = II + 1                                                       GEOMBX  00451
  560 CONTINUE                                                          GEOMBX  00452
  570 CONTINUE                                                          GEOMBX  00453
C         ICT    = X-LOCATION OF AFT-MOST TAIL BOX ON THE CHORD         GEOMBX  00454
      EL  = COS(PSIW)*CAPL*XSUBDV + SIN(PSIDIF)*YCT                     GEOMBX  00455
C         EL     = PERPENDICULAR DISTANCE FROM RECEIVING CHORD TO RIGHT GEOMBX  00456
C                  WING PLANE, POSITIVE DOWNWARD.                     GEOMBX  00457
C                                                                       GEOMBX  00458
C         ENTRY INTO THE LOOP FOR WASH SAMPLING CHORDS, FROM 705*       GEOMBX  00459
  580 CONTINUE                                                          GEOMBX  00460
C     START OF LOOP ON WING CHORDS, ENDING AT 650                       GEOMBX  00461
      JW = NSUBCN                                                       GEOMBX  00462
  600 CONTINUE                                                          GEOMBX  00463
      YJW = JW - .5                                                     GEOMBX  00464
C             YJW    = Y-OFFSET OF SENDING CHORD FROM CENTER LINE,      GEOMBX  00465
C                      WING PLANE                                       GEOMBX  00466
      YMUBAR = -YJW + COS(PSIDIF)*YCT + SIN(PSIW)*CAPLL*XSUBDV          GEOMBX  00467
C             YMUBAR = Y-DISTANCE BETWEEN CHORD CENTERS, SENDING (WING) GEOMBX  00468
C                      PLANE                                            GEOMBX  00469
      IF (ABS(YMUBAR) .LE. HALFBX) GO TO 630                            GEOMBX  00470
      IF (YMUBAR .LT. -HALFBX) YMUBAR = YMUBAR + HALFBX                 GEOMBX  00471
      IF (YMUBAR .GT.  HALFBX) YMUBAR = YMUBAR - HALFBX                 GEOMBX  00472
C             YMUBAR = Y-DISTANCE TO NEAREST BOX EDGE, WING PLANE       GEOMBX  00473
      XMUBAR = SQRT(YMUBAR**2  +  (EL*XSUBDV)**2 )                      GEOMBX  00474
C             XMUBAR = DISTANCE FORWARD FROM RECEIVING CENTER TO NEAR-  GEOMBX  00475
C                      EST PORTION OF SENDING CHORD                     GEOMBX  00476
      GO TO 635                                                         GEOMBX  00477
  630 CONTINUE                                                          GEOMBX  00478
      XMUBAR = ABS(EL)*XSUBDV                                           GEOMBX  00479
  635 CONTINUE                                                          GEOMBX  00480
      XMUBAR = XMUBAR + HALFBX                                          GEOMBX  00481
      INTRST = ICT - IFIX(XMUBAR+EPS - AMOD(XMUBAR,XSUBDV) )            GEOMBX  00482
      IF (JW .GT. MYBBSW) GO TO 640                                     GEOMBX  00483
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      IWAKE(JW) = MAXO(IWAKE(JW),INTRST)                                GEOMBX  00484
      GO TO 650                                                         GEOMBX  00485
  640 CONTINUE                                                          GEOMBX  00486
      IF (INTRST .LE. JW-JDIAG) GO TO 660                               GEOMBX  00487
      MYBBSW = JW                                                       GEOMBX  00488
      IWAKE(JW) = INTRST                                                GEOMBX  00489
  650 CONTINUE                                                          GEOMBX  00490
      IF (NSUBD2 .EQ. 0) GO TO 657                                      GEOMBX  00491
      DO 655 I = 1,NSUBD2                                               GEOMBX  00492
      IWAKE(JW-I) = IWAKE(JW) - I                                       GEOMBX  00493
      IWAKE(JW+I) = IWAKE(JW) - I                                       GEOMBX  00494
  655 CONTINUE                                                          GEOMBX  00495
  657 CONTINUE                                                          GEOMBX  00496
      JW = JW + NSUBDV                                                  GEOMBX  00497
      GO TO 600                                                         GEOMBX  00498
C         END OF LOOP ON WING CHORDS                                    GEOMBX  00499
C                                                                       GEOMBX  00500
  660 CONTINUE                                                          GEOMBX  00501
      IF (ISHPLW .NE. 0) GO TO 706                                      GEOMBX  00502
  680 CONTINUE                                                          GEOMBX  00503
      JT = JT + NSUBDV                                                  FTNX1   00023
      IF (JT .LE. MYBBST) GO TO 525                                     FTNX1   00024
C         END OF LOOP ON TAIL CHORDS, FROM 548*                         GEOMBX  00504
C                                                                       GEOMBX  00505
  685 CONTINUE                                                          GEOMBX  00506
      MXBBSW = MXBSW                                                    GEOMBX  00507
      DO 690 JW = NSUBCN,MYBBSW,NSUBDV                                  GEOMBX  00508
      MXBBSW = MAXO(MXBBSW,IWAKE(JW))                                   GEOMBX  00509
  690 CONTINUE                                                          GEOMBX  00510
      MXBBW = MXBBSW                                                    GEOMBX  00511
      IF (NSUBDV .GT. 1) MXBBW = (MXBBW-IXBW)/NSUBDV + 1                GEOMBX  00512
      IF (CHECKPR) WRITE(NT6,7010) (IWAKE(I),I=1,MYBBSW)                GEOMBX  00513
      GO TO 720                                                         GEOMBX  00514
C                                                                       GEOMBX  00515
C         THE TWO SURFACES ARE COPLANAR.  ENTER THE SECOND PLANFORM     GEOMBX  00516
C         INTO THE SAME BOX ARRAY                                       GEOMBX  00517
  700 CONTINUE                                                          GEOMBX  00518
      COPLAN = .T.                                                      GEOMBX  00519
      CALL BXCOPF(XTLE,YTLE,NTLE, XTTE,YTTE,NTTE, LBXCDW,IBOXW)         GEOMBX  00520
      MXBBSW = MXBST                                                    GEOMBX  00521
      IF (.NOT. CHECKPR) GO TO 720                                      GEOMBX  00522
      CALL PRNTBC(IBOXW,LBXCDW, IXBST, MXBST,MYBST,.T.)                 GEOMBX  00523
      II = MYBSW + 1                                                    GEOMBX  00524
      III = MYBSW + MYBST                                               GEOMBX  00525
      WRITE (NT6,7040) (FEXLOC(I), I = II,III)                          GEOMBX  00526
      WRITE (NT6,7045) (TEXLOC(I), I = II,III)                          GEOMBX  00527
      GO TO 720                                                         GEOMBX  00528
C         NO TAIL IS DEFINED.  IS DOWNWASH SAMPLING DESIRED-            GEOMBX  00529
  705 CONTINUE                                                          GEOMBX  00530
      COPLAN = .F.                                                      GEOMBX  00531
      IF (ISHPLW .EQ. 0) GO TO 720                                      GEOMBX  00532
C         BYPASS THE TAIL PLANFORM AND BOX CODE SETUP, AND LOOP ON SAMPL GEOMBX  00533
C         CHORDS TO DEFINE WING WAKE REGION                             GEOMBX  00534
C       ( DO 706 JCHRD = 1,ISHPLW )                                     FTNX1   00025
      JCHRD = 1                                                         FTNX1   00026
  704 CONTINUE                                                          FTNX1   00027
      JT = (ICHORD(JCHRD)-1)*NSUBDV + NSUBCN                            GEOMBX  00536
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      IF (IBOXF(JCHRD) .EQ. INIT) IBOXF(JCHRD) = (TEXLOC(JT)-IXBW)/      GEOMBX  00537
     1                            NSUBDV  + 1                           GEOMBX  00538
      IF (IBOXL(JCHRD) .EQ. INIT) IBOXL(JCHRD) = (TEXLOC(JT)-IXBW)/      GEOMBX  00539
     1                            NSUBDV  + 1                           GEOMBX  00540
      YCT = JT - .5                                                     GEOMBX  00541
      ICT = (IBOXL(JCHRD)-1) * NSUBDV + IXBW                            GEOMBX  00542
      EL = COS(PSIW) * ZLOC(JCHRD) - SIN(PSIW) * YCT                    GEOMBX  00543
      CAPLL = ZLOC(JCHRD)                                               GEOMBX  00544
      GO TO 580                                                         GEOMBX  00545
C         THE LOGIC FOR A TAIL CHORD IS USED.  AFTER THE WING WAKE      GEOMBX  00546
C         BOUNDS ARE DETERMINED FOR THIS TAIL CHORD, CONTROL IS RETURNED GEOMBX  00547
C         TO THIS LOOP                                                  GEOMBX  00548
  706 CONTINUE                                                          GEOMBX  00549
  708 CONTINUE                                                          GEOMBX  00550
      JCHRD = JCHRD + 1                                                 FTNDI   00028
      IF (JCHRD .LE. ISMPLW) GO TO 704                                  FTNDI   00029
C         END OF LOOP ON SAMPLE CHORDS                                  GEOMBX  00551
      GO TO 685                                                         GEOMBX  00552
C                                                                       GEOMBX  00553
C         GET DIAPHRAGM BOXES CODES FOR THE WING                        GEOMBX  00554
  720 CONTINUE                                                          GEOMBX  00555
      CALL BXCDI (IWAKE,LBXCDW,LSCHDS, IBOXW )                          GEOMBX  00556
C         RETURNS - IBOXW,   CODES 2 AND 3 ADDED FOR DIAPHRAGM REGIONS  GEOMBX  00557
C                   MYBBSW = NUMBER OF SUBDIVIDED CHORDS, INCLUDING DIA- GEOMBX  00558
C                            PHRAGM                                     GEOMBX  00559
C                   MYBBW  = NUMBER OF UNSUBDIVIDED CHORDS              GEOMBX  00560
C                                                                       GEOMBX  00561
C         PRINT BOX CODES                                               GEOMBX  00562
      IF (.NOT. (PRBOX .OR. CHECKPR) ) GO TO 725                        GEOMBX  00563
      CALL PRNTBC(IBOXW,LBXCDW, 1, MXBBSW,  MYBBSW, .T.)                GEOMBX  00564
      IF (NSUBDV .NE. 1)  CALL PRNTBC(IBOXW,LBXCDW,                     GEOMBX  00565
     1     1, (MXBBSW-IXBW+NSUBDV)/NSUBDV,  MYBBW, .F. )                GEOMBX  00566
  725 CONTINUE                                                          GEOMBX  00567
C                                                                       GEOMBX  00568
C         DETERMINE THE PLANAR AIC ARRAY SIZE                           GEOMBX  00569
      NFLKRN = MAXO(MXBBW, MXBT-IXBT/NSUBDV + 1)                        GEOMBX  00570
      IF (COPLAN) NFLKRN = MXBT                                         GEOMBX  00571
C                                                                       GEOMBX  00572
C         WRITE THE BOX CODE ARRAYS INTO THE GEOMETRY SCRATCH FILE      GEOMBX  00573
      REWIND IGEOSC                                                     GEOMBX  00574
      CALL RDINIT                                                       GEOMBX  00575
      ITYPE = 5HMIXED                                                   GEOMBX  00576
      IVAL = 5HIBOXW                                                    GEOMBX  00577
      PARM(1)  = 0.                                                     GEOMBX  00578
      PARM(2)  = XMACH                                                  GEOMBX  00579
      M = MXBBSW                                                        GEOMBX  00580
      N = (MYBBSW-1)/NBWRD + 1                                          GEOMBX  00581
      K = LBXCDW                                                        GEOMBX  00582
      CALL WRTEMX(IGEOSC,MXWRIT,RANDOU,NFS,NMS,LS,NWR,LWS,K,ID,         GEOMBX  00583
     1            IBOXW, ITYPE, M,N, PARM, IRR )                        GEOMBX  00584
      IF (IRR .NE. 0) GO TO 8070                                        GEOMBX  00585
C                                                                       GEOMBX  00586
      IF (NSURF .EQ. 1) GO TO 730                                       GEOMBX  00587
      IF (COPLAN) GO TO 730                                             GEOMBX  00588
      IVAL = 5HIBOXT                                                    GEOMBX  00589
      M = MXBST - IXBST + 1                                             GEOMBX  00590
      N = (MYBBST - 1)/NBWRD + 1                                        GEOMBX  00591
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      K = LBXCDT                                                        GEOMBX  00592
      CALL WRTEMX(IGEOSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,K,ID,         GEOMBX  00593
     1            IBOXT, ITYPE, M,N, PARM, IRR)                         GEOMBX  00594
      IF (IRR .NE. 0) GO TO 8070                                        GEOMBX  00595
C                                                                       GEOMBX  00596
C         CHECK FOR DIAPHRAGMS CROSSING VERTICALLY                      GEOMBX  00597
      IF (YCROSS .LE. .5) GO TO 730                                     GEOMBX  00598
      IF ( FLOAT(MYBBT)*COS(PSIT) .LT. YCROSS) GO TO 730                GEOMBX  00599
      IF ( FLOAT(MYBBW)*COS(PSIW) .GE. YCROSS) GO TO 8080               GEOMBX  00600
C                                                                       GEOMBX  00601
C         WRITE THE LEADING AND TRAILING EDGE LOCATIONS ONTO SCRATCH    GEOMBX  00602
  730 CONTINUE                                                          GEOMBX  00603
      M = 1                                                             GEOMBX  00604
      N = MYBSW + MYBST                                                 GEOMBX  00605
      K = 1                                                             GEOMBX  00606
      IVAL = GHFEXLOC                                                   GEOMBX  00607
      CALL WRTEMX(IGEOSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS, K, ID,       GEOMBX  00608
     1            FEXLOC, ITYPE, M,N, PARM, IRR)                        GEOMBX  00609
      IF (IRR .NE. 0) GO TO 8070                                        GEOMBX  00610
      IVAL = GHTEXLOC                                                   GEOMBX  00611
      CALL WRTEMX(IGEOSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS, K, ID,       GEOMBX  00612
     1            TEXLOC, ITYPE, M,N, PARM, IRR)                        GEOMBX  00613
      IF (IRR .NE. 0) GO TO 8070                                        GEOMBX  00614
C                                                                       GEOMBX  00615
C         DETERMINE THE ON-PLANFORM FRACTIONAL PART OF ALL UNSUBDIVIDED GEOMBX  00616
C         BOXES CUT BY A PLANFORM EDGE                                  GEOMBX  00617
      CALL GMAREA(IBOXW,LBXCDW, .T., ALPHA,IJALPH, NALPHW)              GEOMBX  00618
      NALPH = NALPHW                                                    GEOMBX  00619
      IF (NSURF .EQ. 1 .OR. COPLAN) GO TO 740                           GEOMBX  00620
      CALL GMAREA(IBOXT(ISUBT,1),LBXCDT, .F., ALPHA(NALPHW+1),          GEOMBX  00621
     1            IJALPH(NALPHW+1), NALPHT)                             GEOMBX  00622
      NALPH = NALPH + NALPHT                                            GEOMBX  00623
  740 CONTINUE                                                          GEOMBX  00624
      IF (CHECKPR) WRITE(NT6,7030) (IJALPH(I), ALPHA(I),I=1,NALPH )     GEOMBX  00625
C                                                                       GEOMBX  00626
C         WRITE THE AREA MULTIPLIERS                                    GEOMBX  00627
      M = 1                                                             GEOMBX  00628
      N = NALPH                                                         GEOMBX  00629
      K = 1                                                             GEOMBX  00630
      IPARM(3) = NALPHW                                                 GEOMBX  00631
      IVAL  = SHALPHA                                                   GEOMBX  00632
      CALL WRTEMX(IGEOSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS, K, ID,       GEOMBX  00633
     1            ALPHA,  ITYPE, M,N, PARM, IRR)                        GEOMBX  00634
      IF (IRR .NE. 0) GO TO 8070                                        GEOMBX  00635
      IVAL  = GHIJALPH                                                  GEOMBX  00636
      CALL WRTEMX(IGEOSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS, K, ID,       GEOMBX  00637
     1            IJALPH, ITYPE, M,N, PARM, IRR)                        GEOMBX  00638
      IF (IRR .NE. 0) GO TO 8070                                        GEOMBX  00639
C                                                                       GEOMBX  00640
C         DETERMINE THE SPATIAL AIC PARAMETERS                          GEOMBX  00641
C         THE MUAIC ARRAYS ARE WRITTEN TEMPORARILY ON IVPSC FOR EDITTING GEOMBX  00642
C         ONTO IWTFSC.  AFTER THE KPT-- ARRAYS ARE WRITTEN ON           GEOMBX  00643
C         IGEOSC,    ALL NSPATK ARRAYS ARE TRANSFERRED TO IGEOSC        GEOMBX  00644
C             ISCR   = NUMBER OF MUAICS TRANSFERRED TO IWTFSC           GEOMBX  00645
C              NSCR  = TOTAL NUMBER OF MUAICS PRESENTLY ON IVPSC        GEOMBX  00646
C                                                                       GEOMBX  00647
      ISCR = 0                                                          GEOMBX  00648
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      NSCR = 0                                                          GEOMBX  00649
      NROWSR = 0                                                        GEOMBX  00650
      NROWSLL = 0                                                       GEOMBX  00651
      IPARM(3) = 0                                                      GEOMBX  00652
      IPARM(6) = 0                                                      GEOMBX  00653
      REWIND IWTFSC                                                     GEOMBX  00654
      REWIND IVPSC                                                      GEOMBX  00655
      M = 2                                                             GEOMBX  00656
      K = 2                                                             GEOMBX  00657
      NSPATK = 0                                                        GEOMBX  00658
      NWAK = 0                                                          GEOMBX  00659
      IF (SYM .EQ. 0) GO TO 904                                         GEOMBX  00660
      IF (PSIW .EQ. 0 .OR. .NOT. DIHW) GO TO 800                        GEOMBX  00661
C                                                                       GEOMBX  00662
C        START OF LOOP FOR WING-WING PARAMETERS ON RECEIVING CHORDS,    GEOMBX  00663
C        UNSUBDIVIDED  (DETERMINES SPATIAL MUAIC VALUES)                GEOMBX  00664
      DO  790 JCOL =1,MYBBW                                             GEOMBX  00665
C                                                                       GEOMBX  00666
      CALL PWMAIC (.T., IBOXW,LBXCDW, IWAKE, JCOL)                      GEOMBX  00667
C        COMPUTES MUAIC ARRAY FOR THE LEFT SURFACE CONTRIBUTION TO      GEOMBX  00668
C        CHORD JCOL OF THE RIGHT SURFACE                                GEOMBX  00669
C             SURF = .T. INDICATES SOME RIGHT SURFACE CONTRIBUTION WAS  GEOMBX  00670
C                  FOUND                                                GEOMBX  00671
      IF (.NOT. SURF) GO TO 800                                         GEOMBX  00672
      NWAK = NWAK + 1                                                   GEOMBX  00673
      NSPATK = NWAK                                                     GEOMBX  00674
      KPTWW(NWAK) = NSPATK                                              GEOMBX  00675
      IVAL = 10H WING-WING                                              GEOMBX  00676
      IF (CHECKFR) WRITE(NT6,7020) IVAL,JCOL,YBAR,EL, NROWS,(MUAIC(1,   GEOMBX  00677
     1    NROWS-I+1),MUAIC(2,NROWS-I+1), I=1,NROWS)                     GEOMBX  00678
C                                                                       GEOMBX  00679
C        WRITE MUAIC ARRAY ON THE SCRATCH FILE                          GEOMBX  00680
      N = NROWS                                                         GEOMBX  00681
      PARM(4) = YBAR                                                    GEOMBX  00682
      PARM(5) = EL                                                      GEOMBX  00683
      CALL WRTEMX(IVPSC, MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS, K, ID,       GEOMBX  00684
     1            MUAIC, ITYPE, M,N, PARM, IRR)                         GEOMBX  00685
      IF (IRR .NE. 0) GO TO 8075                                        GEOMBX  00686
      NSCR = NSCR + 1                                                   GEOMBX  00687
C                                                                       GEOMBX  00688
  790 CONTINUE                                                          GEOMBX  00689
C        END OF LOOP ON RECEIVING CHORDS FOR WING-WING PARAMETERS,      GEOMBX  00690
C                                                                       GEOMBX  00691
  800 CONTINUE                                                          GEOMBX  00692
      NTTK = 0                                                          GEOMBX  00693
      IF (NSURF .NE. 2) GO TO 900                                       GEOMBX  00694
      IF (SYMT .EQ. 0) GO TO 900                                        GEOMBX  00695
      IF (PSIT .EQ. 0 .OR. .NOT. DIHT) GO TO 900                        GEOMBX  00696
      IF (PSIDIF .EQ. 0.) REWIND IVPSC                                  GEOMBX  00697
C                                                                       GEOMBX  00698
C        START OF LOOP FOR TAIL-TAIL PARAMETERS ON RECEIVING CHORDS,    GEOMBX  00699
C        UNSUBDIVIDED                                                   GEOMBX  00700
      DO 895  JCOL = 1,MYBBT                                            GEOMBX  00701
C                                                                       GEOMBX  00702
      CALL PWMAIC (.F., IBOXT(ISUBT,1),LBXCDT, IWAKE, JCOL)             GEOMBX  00703
C        COMPUTES MUAIC ARRAY FOR THE CONTRIBUTION OF THE LEFT TAIL ON  GEOMBX  00704
C        CHORD JCOL OF THE RIGHT TAIL SURFACE                           GEOMBX  00705
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C                                                                       GEOMBX  00706
      IF (.NOT. SURF) GO TO 900                                         GEOMBX  00707
      NTTK = NTTK + 1                                                   GEOMBX  00708
C                                                                       GEOMBX  00709
      IVAL = 10H TAIL-TAIL                                              GEOMBX  00710
C         IF THE WING AND TAIL HAVE THE SAME DIHEDRAL, MODIFY THE WING  GEOMBX  00711
C         MUAIC ARRAY WHERE NEEDED BY THE TAIL, AND USE IT              GEOMBX  00712
      IF (PSIDIF .EQ. 0.) GO TO 840                                     GEOMBX  00713
C         OTHERWISE, WRITE THE MUAICS FOUND ONTO IVPSC                  GEOMBX  00714
      NSPATK = NSPATK + 1                                               GEOMBX  00715
      KPTTT(NTTK) = NSPATK                                              GEOMBX  00716
      IVAL = 10H TAIL-TAIL                                              GEOMBX  00717
      IF (CHECKPR) WRITE(NT6,7020) IVAL,JCOL,YBAR,EL, NROWS,(MUAIC(1,   GEOMBX  00718
     1    NROWS-I+1),MUAIC(2,NROWS-I+1), I=1,NROWS)                     GEOMBX  00719
C                                                                       GEOMBX  00720
C         WRITE MUAIC ARRAY ON SCRATCH FILE                             GEOMBX  00721
      N = NROWS                                                         GEOMBX  00722
      PARM(4) = YBAR                                                    GEOMBX  00723
      PARM(5) = EL                                                      GEOMBX  00724
      CALL WRTEMX(IVPSC, MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS, K, ID,       GEOMBX  00725
     1            MUAIC, ITYPE, M,N, PARM, IRR)                         GEOMBX  00726
      IF (IRR .NE. 0) GO TO 8075                                        GEOMBX  00727
      NSCR = NSCR + 1                                                   GEOMBX  00728
C                                                                       GEOMBX  00729
      GO TO 895                                                         GEOMBX  00730
  840 CONTINUE                                                          GEOMBX  00731
      IF (ISCR .GE. NSCR) GO TO 850                                     GEOMBX  00732
      CALL RDINIT                                                       GEOMBX  00733
      CALL READMX(IVPSC, MXWRIT,RANDOU,NFS,NMS,LS,NMR, K, NID,ID,       GEOMBX  00734
     1            ITYPE, LRS,  MUAICL, M,N, PARM, IRR)                  GEOMBX  00735
      IF (IRR .NE. 0) GO TO 8090                                        GEOMBX  00736
      ISCR = ISCR + 1                                                   GEOMBX  00737
C         MERGE THE TWO MUAIC ARRAYS                                    GEOMBX  00738
      DO 845 I = 1,N                                                    GEOMBX  00739
      IF (I .GT. NROWS) GO TO 842                                       GEOMBX  00740
      IF (MUAICL(1,I) .EQ. 0) GO TO 845                                 GEOMBX  00741
      IF (MUAIC(1,I)  .EQ. 0) GO TO 842                                 GEOMBX  00742
      MUAIC(1,I) = MIND( MUAIC(1,I),MUAICL(1,I) )                       GEOMBX  00743
      MUAIC(2,I) = MAXD( MUAIC(2,I),MUAICL(2,I) )                       GEOMBX  00744
      GO TO 845                                                         GEOMBX  00745
  842 MUAIC(1,I) = MUAICL(1,I)                                          GEOMBX  00746
      MUAIC(2,I) = MUAICL(2,I)                                          GEOMBX  00747
  845 CONTINUE                                                          GEOMBX  00748
      NROWS = MAXO(NROWS,N)                                             GEOMBX  00749
      KPTTT(NTTK) = ISCR                                                GEOMBX  00750
      IF (CHECKPR) WRITE(NT6,7020) IVAL,JCOL,YBAR,EL, NROWS,            GEOMBX  00751
     1    (MUAIC(1,NROWS-I+1),MUAIC(2,NROWS-I+1), I = 1,NROWS)          GEOMBX  00752
      GO TO 855                                                         GEOMBX  00753
C         THERE WERE NO MATRICES TO BE MERGED                           GEOMBX  00754
  850 NSPATK = NSPATK + 1                                               GEOMBX  00755
      KPTTT(NTTK) = NSPATK                                              GEOMBX  00756
C         WRITE MERGED AICS ONTO 2ND SCRATCH FILE                       GEOMBX  00757
  855 CONTINUE                                                          GEOMBX  00758
      N = NROWS                                                         GEOMBX  00759
      CALL WRTEMX(IWTFSC, MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS, K, ID,      GEOMBX  00760
     1            MUAIC, ITYPE, M,N, PARM, IRR)                         GEOMBX  00761
      IF (IRR .NE. 0) GO TO 8110                                        GEOMBX  00762
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C                                                                       GEOMBX  00763
  895 CONTINUE                                                          GEOMBX  00764
C         END OF LOOP FOR TAIL-TAIL PARAMETERS, FROM 800*               GEOMBX  00765
C                                                                       GEOMBX  00766
  900 CONTINUE                                                          GEOMBX  00767
C         COMPLETE ANY COPY FROM FIRST TO SECOND SCRATCH FILE           GEOMBX  00768
      IF (ISCR .EQ. 0) REWIND IVPSC                                     GEOMBX  00769
      IF (ISCR .GE. NSCR) GO TO 904                                     GEOMBX  00770
      II = ISCR + 1                                                     GEOMBX  00771
      DO 902 I = II,NSCR                                                GEOMBX  00772
      CALL RDINIT                                                       GEOMBX  00773
      CALL READMX(IVPSC, MXWRIT,RANDOU,NFS,NMS,LS,NMR, K, NID,ID,       GEOMBX  00774
     1            ITYPE, LRS,  MUAIC,  M,N, PARM, IRR)                  GEOMBX  00775
      IF (IRR .NE. 0) GO TO 8090                                        GEOMBX  00776
      CALL WRTEMX(IWTFSC, MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS, K, ID,      GEOMBX  00777
     1            MUAIC, ITYPE, M,N, PARM, IRR)                         GEOMBX  00778
      IF (IRR .NE. 0) GO TO 8110                                        GEOMBX  00779
  902 CONTINUE                                                          GEOMBX  00780
  904 CONTINUE                                                          GEOMBX  00781
C         COMPUTE THE RIGHT AND LEFT WING INFLUENCE PARAMETERS ON THE   GEOMBX  00782
C         TAIL OR SAMPLE CHORDS                                         GEOMBX  00783
      NRWTK = 0                                                         GEOMBX  00784
      NLWTK = 0                                                         GEOMBX  00785
      ISCR = 0                                                          GEOMBX  00786
      NSCR2 = 0                                                         GEOMBX  00787
      REWIND IVPSC                                                      GEOMBX  00788
      IPARM(6) = 1                                                      GEOMBX  00789
C         INITIALIZE THE MUAIC ARRAYS                                   GEOMBX  00790
      DO  908  I = 1,50                                                 GEOMBX  00791
      MUAIC(1,I) = I+I                                                  GEOMBX  00792
      MUAIC(2,I) = 0                                                    GEOMBX  00793
      MUAICL(1,I) = I+I                                                 GEOMBX  00794
      MUAICL(2,I)= 0                                                    GEOMBX  00795
  908 CONTINUE                                                          GEOMBX  00796
      IF (CCPLAN) GO TO 1015                                            GEOMBX  00797
      IF (NSURF .NE. 2) GO TO 1120                                      GEOMBX  00798
      CAPLL = CAPL                                                      GEOMBX  00799
      YMUVSP = CAPLL*SIN(PSIW)                                          GEOMBX  00800
      JTCOL = MYBSW - NSUBD2                                            GEOMBX  00801
C                                                                       GEOMBX  00802
C         START OF LOOP ON TAIL CHORDS, TO COMPUTE                      GEOMBX  00803
C         WING - TAIL INFLUENCE PARAMETERS                              GEOMBX  00804
C       ( DO 1010 JCOL = 1,MYBBT )                                      FTNX1   00030
      JCOL = 1                                                          FTNX1   00031
  909 CONTINUE                                                          FTNX1   00032
      IF (JCOL .LE. MYBT) GO TO 910                                     GEOMBX  00806
      IROW = (IXBT-IXBW)/NSUBDV + 1                                     GEOMBX  00807
      GO TO 915                                                         GEOMBX  00808
  910 CONTINUE                                                          GEOMBX  00809
      JTCOL = JTCOL + NSUBDV                                            GEOMBX  00810
      IROW = (TEXLOC(JTCOL)-IXBW)/NSUBDV + 1                            GEOMBX  00811
      IF (IROW .EQ. MXBT) GO TO 930                                     GEOMBX  00812
  915 CONTINUE                                                          GEOMBX  00813
      CALL DCODER(IBOXT(ISUBT,1),LBXCDT, IROW,JCOL, MXBT,JCOL,.F.,ICODE) GEOMBX  00814
      II = 1                                                            GEOMBX  00815
      DO 917 I = IROW,MXBT                                              GEOMBX  00816
      IF (ICODE(II) .NE. 0) GO TO 918                                   GEOMBX  00817
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      II = II + 1                                                    GEOMBX  00818
  917 CONTINUE                                                       GEOMBX  00819
  918 CONTINUE                                                       GEOMBX  00820
      III = I                                                        GEOMBX  00821
      DO 920 I = III, MXBT                                           GEOMBX  00822
      IF (ICODF(II) .EQ. 0) GO TO 925                                GEOMBX  00823
      II = II + 1                                                    GEOMBX  00824
  920 CONTINUE                                                       GEOMBX  00825
  925 IROW = IROW + II - 2                                           GEOMBX  00826
C         ENTRY INTO THE LOOP FROM SAMPLE WASH LOOP, FROM 1120*      GEOMBX  00827
  930 CONTINUE                                                       GEOMBX  00828
      CALL PWTAIC( IBOXW,LBXCDW, IROW,JCOL,  CAPLL, YMUVSP)          GEOMBX  00829
C         GETS THE MUAIC AND MUAICL ARRAYS FOR RIGHT AND LEFT CONTRI- GEOMBX  00830
C         BUTIONS TO THE TAIL                                        GEOMBX  00831
      IF (SURF) GO TO 935                                            GEOMBX  00832
      IF ( .NOT. SURFL) GO TO 1015                                   GEOMBX  00833
      GO TO 985                                                      GEOMBX  00834
  935 NRWTK = NRWTK + 1                                              GEOMBX  00835
C         DETERMINE WHETHER WING AND TAIL ARE PARALLEL               GEOMBX  00836
      IF (PSIDIF .EQ. 0 .AND. NSURF .EQ. 2) GO TO 940                GEOMBX  00837
      NSPATK = NSPATK + 1                                            GEOMBX  00838
      KPTRWT(NRWTK) = NSPATK                                         GEOMBX  00839
C         WRITE NEW MUAIC ARRAY ON SCRATCH                           GEOMBX  00840
      IVAL = 10HR WNG-TAIL                                           GEOMBX  00841
      N = NROWS                                                      GEOMBX  00842
      PARM(4) = YBAR                                                 GEOMBX  00843
      PARM(5) = EL                                                   GEOMBX  00844
      CALL WRTEMX(IVPSC, MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS, K, ID,    GEOMBX  00845
     1            MUAIC, ITYPE, M,N, PARM, IRR)                      GEOMBX  00846
      IF (IRR .NE. 0) GO TO 8075                                     GEOMBX  00847
      NSCR2= NSCR2 + 1                                               GEOMBX  00848
      IF (CHECKPR) WRITE(NT6,7020) IVAL,JCOL,YBAR,EL, NROWS,(MUAIC(1, GEOMBX  00849
     1    NROWS-I+1),MUAIC(2,NROWS-I+1), I=1,NROWS)                  GEOMBX  00850
C         REINITIALIZE THE RIGHT MUAIC ARRAY                         GEOMBX  00851
      DO 937 I = 1,NROWS                                             GEOMBX  00852
      MUAIC(1,I) = I+I                                               GEOMBX  00853
      MUAIC(2,I) = 0                                                 GEOMBX  00854
  937 CONTINUE                                                       GEOMBX  00855
C                                                                    GEOMBX  00856
      GO TO 982                                                      GEOMBX  00857
C         OLD MUAIC ARRAY HAS BEEN FOUND WHICH MATCHES               GEOMBX  00858
  940 CONTINUE                                                       GEOMBX  00859
C         ALL RIGHT HAND MUAICS ARE THE SAME, PARALLEL SURFACES      GEOMBX  00860
      IF (JCOL .GT. 1) GO TO 945                                     GEOMBX  00861
      NSPATK = NSPATK + 1                                            GEOMBX  00862
      IPARAL = NSPATK                                                GEOMBX  00863
  945 CONTINUE                                                       GEOMBX  00864
      KPTRWT(NRWTK) = IPARAL                                         GEOMBX  00865
      NROWSR = MAXO(NROWSR,NROWS)                                    GEOMBX  00866
C                                                                    GEOMBX  00867
  980 CONTINUE                                                       GEOMBX  00868
      IVAL = 10HR WNG-TAIL                                           GEOMBX  00869
      IF (CHECKPR) WRITE(NT6,7020) IVAL,JCOL,YBAR,EL, NROWS,(MUAIC(1, GEOMBX  00870
     1    NROWS-I+1),MUAIC(2,NROWS-I+1), I=1,NROWS)                  GEOMBX  00871
C                                                                    GEOMBX  00872
  982 CONTINUE                                                       GEOMBX  00873
      IF (.NOT. SURFL) GO TO 1000                                    GEOMBX  00874
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  985 CONTINUE                                                          GEOMBX  00875
      NLWTK = NLWTK + 1                                                 GEOMBX  00876
C         DETERMINE WHETHER BOTH SURFACES HAVE NO DIHEDRAL              GEOMBX  00877
      IF (PSIW .EQ. 0. .AND. PSIDIF .EQ. 0. .AND. NSURF .EQ. 2) GO TO 990 GEOMBX  00878
      NSPATK = NSPATK + 1                                               GEOMBX  00879
      KPTLWT(NLWTK) = NSPATK                                            GEOMBX  00880
C         WRITE NEW MUAIC ARRAY ON SCRATCH                              GEOMBX  00881
      IVAL = 10HL WNG-TAIL                                              GEOMBX  00882
      N = NROWSL                                                        GEOMBX  00883
      PARM(4) = YBARL                                                   GEOMBX  00884
      PARM(5) = ELL                                                     GEOMBX  00885
      CALL WRTEMX(IVPSC, MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS, K, ID,       GEOMBX  00886
     1            MUAICL, ITYPE, M,N, PARM, IRR)                        GEOMBX  00887
      IF (IRR .NE. 0) GO TO 8075                                        GEOMBX  00888
      NSCR2 = NSCR2 + 1                                                 GEOMBX  00889
      IF (CHECKPR) WRITE(NT6,7020) IVAL,JCOL,YBARL,ELL, NROWSL,         GEOMBX  00890
     1   (MUAICL(1,NROWSL-I+1),MUAICL(2,NROWSL-I+1), I=1,NROWSL)        GEOMBX  00891
C         REINITIALIZE THE LEFT MUAIC ARRAY                             GEOMBX  00892
      DO 987 I = 1,NROWSL                                               GEOMBX  00893
      MUAICL(1,I) = I+I                                                 GEOMBX  00894
      MUAICL(2,I) = 0                                                   GEOMBX  00895
  987 CONTINUE                                                          GEOMBX  00896
      GO TO 1000                                                        GEOMBX  00897
C         OLD MUAIC ARRAY HAS BEEN FOUND WHICH MATCHES                  GEOMBX  00898
  980 CONTINUE                                                          GEOMBX  00899
C         USE THE SAME ARRAY FOR RIGHT AND LEFT CONTRIBUTIONS           GEOMBX  00900
      KPTLWT(NLWTK) = IPARAL                                            GEOMBX  00901
      NROWSLL = MAXO(NROWSLL,NROWSL)                                    GEOMBX  00902
C                                                                       GEOMBX  00903
  995 CONTINUE                                                          GEOMBX  00904
      IVAL = 10HL WNG-TAIL                                              GEOMBX  00905
      IF (CHECKPR) WRITE(NT6,7020) IVAL,JCOL,YBARL,ELL,NROWSL,          GEOMBX  00906
     1   (MUAICL(1,NROWSL-I+1),MUAICL(2,NROWSL-I+1), I=1,NROWSL)        GEOMBX  00907
 1000 CONTINUE                                                          GEOMBX  00908
      IF (ISMPLW .NE. 0) GO TO 1150                                     GEOMBX  00909
 1010 CONTINUE                                                          GEOMBX  00910
      JCOL = JCOL + 1                                                   FTN001  00033
      IF (JCOL .LE. MYBBT) GO TO 909                                    FTN001  00034
C         END OF LOOP ON CHORDS, FOR WING-TAIL PARAMETERS               GEOMBX  00911
C                                                                       GEOMBX  00912
C         PLACE ANY BUILT UP ARRAY DUE TO PARALLEL SURFACES ON SCRATCH  GEOMBX  00913
      IF (PSIDIF .NE. 0 .OR. PSIW .NE. 0) GO TO 1014                    GEOMBX  00914
C         MERGE THE RIGHT AND LEFT ARRAYS                               GEOMBX  00915
      NROWSX = MIN0(NROWSR,NROWSLL)                                     GEOMBX  00916
      DO 1012 I = 1,NROWSX                                              GEOMBX  00917
      MUAIC(1,I) = MIN0( MUAIC(1,I),MUAICL(1,I) )                       GEOMBX  00918
      MUAIC(2,I) = MAX0( MUAIC(2,I),MUAICL(2,I) )                       GEOMBX  00919
 1012 CONTINUE                                                          GEOMBX  00920
 1014 IF (PSIDIF .NE. 0) GO TO 1015                                     GEOMBX  00921
C         WRITE THE ARRAY ONTO IWTFSC                                   GEOMBX  00922
      IVAL = 10HPARAL TAIL                                              GEOMBX  00923
      PARM(4) = YBAR                                                    GEOMBX  00924
      PARM(5) = EL                                                      GEOMBX  00925
      IPARM(6) = 2                                                      GEOMBX  00926
      N = MAX0( NROWSR,NROWSLL)                                         GEOMBX  00927
      CALL WRTEMX(IWTFSC, MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS, K, ID,      GEOMBX  00928
     1            MUAIC, ITYPE, M,N, PARM, IRR)                         GEOMBX  00929
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      IF (IRR .NE. 0) GO TO 8110                                        GEOMBX  00930
      NSCR = NSCR + 1                                                   GEOMBX  00931
C         PLACE THE KPT-- ARRAYS ON GEOMETRY SCRATCH AS ONE MATRIX.     GEOMBX  00932
 1015 CONTINUE                                                          GEOMBX  00933
      IF (NSPATK .EQ. 0) ENDFILE IGEOSC                                 GEOMBX  00934
      IF (NSPATK .EQ. 0) GO TO 2000                                     GEOMBX  00935
      IPARM(3) = NAAK                                                   GEOMBX  00936
      IPARM(4) = NTTK                                                   GEOMBX  00937
      IPARM(5) = NRWTK                                                  GEOMBX  00938
      IPARM(6) = NLWTK                                                  GEOMBX  00939
      M = 0                                                             GEOMBX  00940
      N = 0                                                             GEOMBX  00941
      IF (NAAK .EQ. 0) GO TO 1030                                       GEOMBX  00942
      M = 1                                                             GEOMBX  00943
      N = NAAK                                                          GEOMBX  00944
      DO 1020 I = 1,NAAK                                                GEOMBX  00945
 1020 KPT(1,I) = KPTAA(I)                                               GEOMBX  00946
 1030 CONTINUE                                                          GEOMBX  00947
      IF (NTTK .EQ. 0) GO TO 1050                                       GEOMBX  00948
      M = M + 1                                                         GEOMBX  00949
      N = MAXO(N,NTTK)                                                  GEOMBX  00950
      DO 1040 I = 1,NTTK                                                GEOMBX  00951
 1040 KPT(M,I) = KPTTT(I)                                               GEOMBX  00952
 1050 CONTINUE                                                          GEOMBX  00953
      IF (NRWTK .EQ. 0) GO TO 1070                                      GEOMBX  00954
      M = M + 1                                                         GEOMBX  00955
      N = MAXO(N,NRWTK)                                                 GEOMBX  00956
      DO 1060 I = 1,NRWTK                                               GEOMBX  00957
 1060 KPT(M,I) = KPTRWT(I)                                              GEOMBX  00958
 1070 CONTINUE                                                          GEOMBX  00959
      IF (NLWTK .EQ. 0) GO TO 1090                                      GEOMBX  00960
      M = M + 1                                                         GEOMBX  00961
      N = MAXO(N,NLWTK)                                                 GEOMBX  00962
      DO 1080 I = 1,NLWTK                                               GEOMBX  00963
 1080 KPT(M,I) = KPTLWT(I)                                              GEOMBX  00964
 1090 CONTINUE                                                          GEOMBX  00965
      K = 4                                                             GEOMBX  00966
      IVAL = 3HKPT                                                      GEOMBX  00967
      CALL WRTEMX(IGEOSC, MXWRIT, RANDOU, NFS,NMS, LS,NMR,LMS, K, ID,   GEOMBX  00968
     1            KPT,   ITYPE, M,N, PARM, IRR)                         GEOMBX  00969
      IF (IRR .NE. 0) GO TO 8070                                        GEOMBX  00970
      END FILE IGEOSC                                                   GEOMBX  00971
C                                                                       GEOMBX  00972
C         MOVE THE MUAIC ARRAYS TO THE GEOMETRY SCRATCH TAPE            GEOMBX  00973
      REWIND IWTFSC                                                     GEOMBX  00974
      REWIND IVPSC                                                      GEOMBX  00975
      IVAL = 6HMUAIC                                                    GEOMBX  00976
      K = 2                                                             GEOMBX  00977
      IF (NSCR .LE. 0) GO TO 1096                                       GEOMBX  00978
      DO 1094 I = 1,NSCR                                                GEOMBX  00979
      CALL RDINIT                                                       GEOMBX  00980
      CALL READMX(IWTFSC, MXWRIT,RANDOU,NFS,NMS,LS,NMR, K, NID,ID,      GEOMBX  00981
     1            ITYPE, LRS,  MUAIC,  M,N, PARM, IRR)                  GEOMBX  00982
      IF (IRR .NE. 0) GO TO 8100                                        GEOMBX  00983
      CALL WRTEMX(IGEOSC, MXWRIT, RANDOU, NFS,NMS, LS,NMR,LMS, K, ID,   GEOMBX  00984
     1            MUAIC, ITYPE, M,N, PARM, IRR)                         GEOMBX  00985
      IF (IRR .NE. 0) GO TO 8070                                        GEOMBX  00986
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 1094 CONTINUE                                                          GEOMBX  00987
 1096 IF (NSCR2 .LE. 0) GO TO 1110                                      GEOMBX  00988
      DO 1100 I = 1,NSCR2                                               GEOMBX  00989
      CALL READMX(IVPSC, MXWRIT,RANDOU,NFS,NMS,LS,NMR, K, NID,ID,       GEOMBX  00990
     1            ITYPE, LRS,  MUAIC, M,N, PARM, IRR)                   GEOMBX  00991
      IF (IRR .NE. 0) GO TO 8090                                        GEOMBX  00992
      CALL WRTEMX(IGEOSC, MXWRIT, RANDOU, NFS,NMS, LS,NMR,LWS, K, ID,   GEOMBX  00993
     1            MUAIC, ITYPE, M,N, PARM, IRR)                         GEOMBX  00994
      IF (IRR .NE. 0) GO TO 8070                                        GEOMBX  00995
 1100 CONTINUE                                                          GEOMBX  00996
 1110 CONTINUE                                                          GEOMBX  00997
      END FILE IGEOSC                                                   GEOMBX  00998
      GO TO 2000                                                        GEOMBX  00999
C                                                                       GEOMBX  01000
C         LOOP ON SAMPLE WASH CHORDS (USED IF ISMPLW .NE. 0) TO         GEOMBX  01001
C         DETERMINE MUAIC ARRAYS FOR RIGHT AND LEFT WING INFLUENCE      GEOMBX  01002
C         ON EACH CHORD                                                 GEOMBX  01003
 1120 CONTINUE                                                          GEOMBX  01004
      NRWTK = 0                                                         GEOMBX  01005
      NLWTK = 0                                                         GEOMBX  01006
      IF (ISMPLW .EQ. 0) GO TO 1015                                     GEOMBX  01007
C       ( DO 1200 JCHRD = 1,ISMPLW )                                    FTNX1   00035
      JCHRD = 1                                                         FTNX1   00036
 1130 CONTINUE                                                          FTNX1   00037
      JCOL = ICHORD(JCHRD)                                              GEOMBX  01009
      CAPLL = ZLOC(JCHRD)                                               GEOMBX  01010
      YMUVSP = CAPLL*SIN(PSIW)                                          GEOMBX  01011
      IROW = IBOXL(JCHRD)                                               GEOMBX  01012
      GO TO 930                                                         GEOMBX  01013
C         THE LOGIC FOR A TAIL CHORD IS USED.  AFTER THE MUAIC ARRAYS   GEOMBX  01014
C         ARE DETERMINED AND STORED, CONTROL IS RETURNED TO THIS LOOP.  GEOMBX  01015
 1150 CONTINUE                                                          GEOMBX  01016
 1200 CONTINUE                                                          GEOMBX  01017
      JCHRD = JCHRD + 1                                                 FTNX1   00038
      IF (JCHRD .LE. ISMPLW) GO TO 1130                                 FTNX1   00039
C         END OF LOOP ON SAMPLE WASH CHORDS                             GEOMBX  01018
C                                                                       GEOMBX  01019
      GO TO 1015                                                        GEOMBX  01020
C                                                                       GEOMBX  01021
 2000 CONTINUE                                                          GEOMBX  01022
      ENDFILE IGEOSC                                                    GEOMBX  01023
      REWIND IGEOSC                                                     GEOMBX  01024
      REWIND IWTFSC                                                     GEOMBX  01025
      REWIND IVPSC                                                      GEOMBX  01026
      RETURN                                                            GEOMBX  01027
C                                                                       GEOMBX  01028
C         OUTPUT FORMATS                                                GEOMBX  01029
C         CARD F                                                        GEOMBX  01030
 8010 FORMAT(1HO,15X,39H- - - -  GEOMETRIC  PARAMETERS  - - - - /       GEOMBX  01031
     1    1HO,29HCARDF -LOCAL AXES DEFINITION-,                        GEOMBX  01032
     2    4X, 10HX-LOCATION, 4X,10HZ-LOCATION, 4X,                     GEOMBX  01033
     2    9HDIHEDRAL ANGLE (PSI) / 27X,5HWING , F10.3,4X, F10.3, 8X,   GEOMBX  01034
     3    .2, 8H DEGREES )                                             GEOMBX  01035
 8012 FORMAT(27X,5HTAIL , F10.3,4X, F10.3, 8X, F7.2, 8H DEGREES )       GEOMBX  01036
C         CARD G                                                        GEOMBX  01037
 8015 FORMAT(1HO,30HCARDG -BOX PATTERN DEFINITION-,5X,6HNCHRDS,10X,     GEOMBX  01038
     1    6HXCENTR,5X,2HCR,4X,5HXEDGE /37X, I3, 8X, F10.4, 6X,F10.4 )   GEOMBX  01039
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 6017 FORMAT(7X,13H-SAMPLE WASH,I3, 8H CHORDS-,5X,6HICHORD,6X,5HIBOXF,    GEOMBX 01040
     1   5X,5HIBOXL, 6X, 4HZLOC /(37X, I3,8X, I3, 7X, I3, 6X, F7.2 ) )   GEOMBX 01041
C         CARD H                                                         GEOMBX 01042
 6021 FORMAT(1HO,40HCARDH -PLANFORM DEFINITION POINT COUNTS-,5X,          GEOMBX 01043
     1  12HLEADING EDGE,4X,13HTRAILING EDGE /42X,4HWING, I7, 9X, I7 )    GEOMBX 01044
 6022 FORMAT(42X,4HTAIL, I7,9X,I7)                                       GEOMBX 01045
C         CARDS I TO L                                                   GEOMBX 01046
 6029 FORMAT(1HO,37HCARDI TO CARDL -PLANFORM DEFINITIONS-,9X,1HX,9X,1HY, GEOMBX 01047
     1   4X,12H(LOCAL AXES) )                                           GEOMBX 01048
 6030 FORMAT( 32X,A10, F9.3, F10.3/ (41X,2F10.3))                        GEOMBX 01049
 6040 FORMAT(1HO,7X,31H-BOX DIMENSIONS-  B1 (LENGTH) = , E18.8,5X,       GEOMBX 01050
     1      17HB1/BETA (WIDTH) =, E18.8)                                GEOMBX 01051
C                                                                        GEOMBX 01052
C         CHECK PRINT FORMATS, USED ONLY WHEN CHECPR = .T.               GEOMBX 01053
 7010 FORMAT(15HOIWAKE ARRAY - , 4OI3 / (15X,4OI3) )                     GEOMBX 01054
 7020 FORMAT(17HOMUAIC ARRAY FOR ,A10, 8H, CHORD I2, 9H, YBAR = F6.3,    GEOMBX 01055
     1    7H, EL = F7.2 / 10X, 3HROW,I3,2I4 / (16X,2I4)  )               GEOMBX 01056
 7030 FORMAT(51HO  IJALPH (= J*1000 + I OCTAL) AND ALPHA ARRAYS, AS      GEOMBX 01057
     1   7H STORED / 6(  5X,13HIJALPH  ALPHA ) / (6(5X,O6, F7.4) )  )    GEOMBX 01058
 7040 FORMAT(21HO CHECK PRINT, FEXLOC/(10F12.7))                         GEOMBX 01059
 7045 FORMAT( 1HO 14X, 6HTEXLOC / (10F12.7) )                            GEOMBX 01060
C                                                                        GEOMBX 01061
C         DIAGNOSTIC FORMATS                                             GEOMBX 01062
 9010 FORMAT(52HO*** WARNING - XEDGE AND XCENTR WERE BOTH SPECIFIED.     GEOMBX 01063
     1  29H XEDGE WILL BE IGNORED *** )                                  GEOMBX 01064
 9020 FORMAT(45HO*** WARNING - SAMPLE WASH SPECIFICATION SET I2,6H IS IN GEOMBX 01065
     1  55H ERROR.  ONLY THE PRECEDING ONES WILL BE CALCULATED *** )     GEOMBX 01066
 9030 FORMAT(53HO*** WARNING - SAMPLING OF UPWASHES CANNOT BE DONE IF    GEOMBX 01067
     1    35H A TAIL HAS BEEN DEFINED.  ISMPLW =,I3,16H WILL BE IGNORED GEOMBX 01068
     2    4H *** )                                                       GEOMBX 01069
 9110 FORMAT(23HO*** ERROR - PARAMETER ,A6,23H WAS NOT SPECIFIED.  IT     GEOMBX 01070
     1    25H MUST ALWAYS BE GIVEN *** )                                 GEOMBX 01071
 9120 FORMAT(53HO*** ERROR - EITHER XEDGE OR XCENTR MUST BE SPECIFIED    GEOMBX 01072
     1    4H *** )                                                       GEOMBX 01073
 9130 FORMAT(13HO*** ERROR - ,A6,29H IS OUTSIDE ALLOWED RANGE *** )      GEOMBX 01074
 9150 FORMAT(13HO*** ERROR - ,A10,23HDEFINITION POINTS ERROR, I3,        GEOMBX 01075
     1    25H, A COMBINATION OF-   *** / 13X,24H1, NON-MONOTONIC Y-VALUE GEOMBX 01076
     2     1H8, 10X,25H2, NON-MONOTONIC X-VALUES  / 13X,11H4, FIRST Y-   GEOMBX 01077
     3    14HVALUE NON-ZERO, 10X,34H8, TIP T.E. Y-VALUE DISAGREES WITH   GEOMBX 01078
     4    15H TIP L.E. VALUE )                                           GEOMBX 01079
 9160 FORMAT(51HO*** ERROR - XCENTR NOT WITHIN 50 BOX LENGTHS (B1 = ,     GEOMBX 01080
     1    E15.8,2OH) OF THE WING L.E. (,E15.8, 5H) *** )                 GEOMBX 01081
 9170 FORMAT(52HO*** ERROR - WHILE WRITING ON GEOMETRY SCRATCH FILE A10,  GEOMBX 01082
     1  15H, ERROR CODE = I4, 4H *** )                                   GEOMBX 01083
 9172 FORMAT(14X, 6HARRAY ,A6,15H, DIMENSIONED (I4,1H,I4,11H) WAS BEING  GEOMBX 01084
     1   8H WRITTEN )                                                   GEOMBX 01085
 9175 FORMAT(14X,20HTHE MUAIC ARRAY FOR A10,15H, DIMENSIONED (I4,1H,I4,  GEOMBX 01086
     1  19H) WAS BEING WRITTEN )                                        GEOMBX 01087
 9180 FORMAT(52HO*** ERROR - THE TAIL AND WING, OR THEIR DIAPHRAGMS,     GEOMBX 01088
     1  28H CROSS - ABOVE TO BELOW *** )                                GEOMBX 01089
 9190 FORMAT(54HO*** ERROR - WHILE READING FROM GEOMETRY SCRATCH FILE    GEOMBX 01090
     1    A10,15H, ERROR CODE = I4, 4H ***)                              GEOMBX 01091
 9192 FORMAT(14X, 6HARRAY ,A6,15H, DIMENSIONED (I4,1H,I4,11H) WAS BEING  GEOMBX 01092
     1   8H READ )                                                       GEOMBX 01093
C                                                                        GEOMBX 01094
C         ERRORS - ALL ERRORS CALL FLUSH                                 GEOMBX 01095
 8010 CONTINUE                                                           GEOMBX 01096
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      WRITE (NT6,9110) IVAL                                             GEOMBX  01097
      GO TO 8900                                                        GEOMBX  01098
 8015 CONTINUE                                                          GEOMBX  01099
      WRITE (NT6,9130) IVAL                                             GEOMBX  01100
      GO TO 8900                                                        GEOMBX  01101
 8020 CONTINUE                                                          GEOMBX  01102
      WRITE (NT6,9120)                                                  GEOMBX  01103
      GO TO 8900                                                        GEOMBX  01104
 8030 CONTINUE                                                          GEOMBX  01105
      WRITE (NT6,9130) IVAL                                             GEOMBX  01106
      GO TO 8900                                                        GEOMBX  01107
 8040 CONTINUE                                                          GEOMBX  01108
      GO TO 8900                                                        GEOMBX  01109
 8050 CONTINUE                                                          GEOMBX  01110
      WRITE (NT6,9150) IVAL,IRR                                         GEOMBX  01111
      GO TO 8900                                                        GEOMBX  01112
 8060 CONTINUE                                                          GEOMBX  01113
      WRITE (NT6,9160) B1, XEDGEW                                       GEOMBX  01114
      GO TO 8900                                                        GEOMBX  01115
 8070 CONTINUE                                                          GEOMBX  01116
      WRITE (NT6,9170) IGEOSC, IRR                                      GEOMBX  01117
      WRITE (NT6,9172) IVAL, M,N                                        GEOMBX  01118
      GO TO 8900                                                        GEOMBX  01119
 8075 CONTINUE                                                          GEOMBX  01120
      WRITE (NT6,9170) IVPSC,IRR                                        GEOMBX  01121
      WRITE (NT6,9175) IVAL, M,N                                        GEOMBX  01122
      GO TO 8900                                                        GEOMBX  01123
 8080 CONTINUE                                                          GEOMBX  01124
      WRITE (NT6,9180)                                                  GEOMBX  01125
      GO TO 8900                                                        GEOMBX  01126
 8090 CONTINUE                                                          GEOMBX  01127
      WRITE (NT6,9190) IVPSC,IRR                                        GEOMBX  01128
      WRITE (NT6,9192) IVAL, M,N                                        GEOMBX  01129
      GO TO 8900                                                        GEOMBX  01130
 8100 WRITE (NT6,9190) IWTFSC,IRR                                       GEOMBX  01131
      WRITE (NT6,9192) IVAL, M,N                                        GEOMBX  01132
      GO TO 8900                                                        GEOMBX  01133
 8110 WRITE (NT6,9170) IWTFSC,IRR                                       GEOMBX  01134
      WRITE (NT6,9175) IVAL, M,N                                        GEOMBX  01135
 8900 CALL FLUSH(1)                                                     GEOMBX  01136
      END                                                               GEOMBX  01137
```

```
      SUBROUTINE EDGCHK(XEDGE,YEDGE,NEDGE,IEDGE,IRR)                    EDGCHK  00002
C                                                                       EDGCHK  00003
C         CHECKS FOR MONOTONIC EDGE VALUES OF X FOR LEADING EDGES, AND  EDGCHK  00004
C         Y FOR EITHER LEADING OR TRAILING.  CHECKS Y FIRST AND LAST    EDGCHK  00005
C         VALUES TO ENSURE DEFINITION FROM CENTERLINE TO TIP            EDGCHK  00006
C              XEDGE  = X-VALUES FOR ONE PLANFORM EDGE                  EDGCHK  00007
C              YEDGE  = Y-VALUES                                        EDGCHK  00008
C              NEDGE  = NUMBER OF (XEDGE,YEDGE) SETS DEFINING THE PLAN- EDGCHK  00009
C                       FORM EDGE                                       EDGCHK  00010
C              IEDGE  = 1 FOR LEADING EDGE, 2 FOR TRAILING EDGE         EDGCHK  00011
C              IRR    = ERROR RETURN, 0 SUCCESSFUL                      EDGCHK  00012
C                       1, NON-MONOTONIC Y-VALUES                       EDGCHK  00013
C                       2, NON-MONOTONIC X-VALUES, LEADING EDGE ONLY    EDGCHK  00014
C                       4, FIRST Y-VALUE NON-ZERO                       EDGCHK  00015
C                       8, TIP Y-VALUE OF A T.E. DISAGREES WITH PREVIOUS EDGCHK  00016
C                          L.E. TIP VALUE                               EDGCHK  00017
C                                                                       EDGCHK  00018
      DIMENSION XEDGE(1),YEDGE(1)                                       EDGCHK  00019
C                                                                       EDGCHK  00020
      IRR = 0                                                           EDGCHK  00021
      IF (YEDGE(1) .NE. 0. ) IRR = 4                                    EDGCHK  00022
      DO 100 I = 2,NEDGE                                                EDGCHK  00023
      IF (YEDGE(I) .LT. YEDGE(I-1) ) GO TO 150                          EDGCHK  00024
      GO TO (50,100), IEDGE                                             EDGCHK  00025
   50 IF (XEDGE(I) .LT. XEDGE(I-1) ) GO TO 200                          EDGCHK  00026
  100 CONTINUE                                                          EDGCHK  00027
      GO TO 250                                                         EDGCHK  00028
  150 IRR = IRR + 1                                                     EDGCHK  00029
      GO TO 250                                                         EDGCHK  00030
  200 IRR = IRR + 2                                                     EDGCHK  00031
  250 CONTINUE                                                          EDGCHK  00032
      GO TO (300,350),IEDGE                                             EDGCHK  00033
  300 YTIP = YEDGE(NEDGE)                                               EDGCHK  00034
      GO TO 500                                                         EDGCHK  00035
  350 IF (YEDGE(NEDGE) .NE. YTIP) IRR = IRR + 8                         EDGCHK  00036
C                                                                       EDGCHK  00037
  500 RETURN                                                            EDGCHK  00038
C                                                                       EDGCHK  00039
      END                                                               EDGCHK  00040
```

```
      SUBROUTINE EDGCHK(XEDGE,YEDGE,NEDGE,IEDGE,IRR)                    EDGCHK  00002
C                                                                       EDGCHK  00003
C        CHECKS FOR MONOTONIC EDGE VALUES OF X FOR LEADING EDGES, AND   EDGCHK  00004
C        Y FOR EITHER LEADING OR TRAILING.  CHECKS Y FIRST AND LAST     EDGCHK  00005
C        VALUES TO ENSURE DEFINITION FROM CENTERLINE TO TIP             EDGCHK  00006
C             XEDGE  = X-VALUES FOR ONE PLANFORM EDGE                   EDGCHK  00007
C             YEDGE  = Y-VALUES                                         EDGCHK  00008
C             NEDGE  = NUMBER OF (XEDGE,YEDGE) SETS DEFINING THE PLAN-  EDGCHK  00009
C                      FORM EDGE                                        EDGCHK  00010
C             IEDGE  = 1 FOR LEADING EDGE, 2 FOR TRAILING EDGE          EDGCHK  00011
C             IRR    = ERROR RETURN, 0 SUCCESSFUL                       EDGCHK  00012
C                      1, NON-MONOTONIC Y-VALUES                        EDGCHK  00013
C                      2, NON-MONOTONIC X-VALUES, LEADING EDGE ONLY     EDGCHK  00014
C                      4, FIRST Y-VALUE NON-ZERO                        EDGCHK  00015
C                      8, TIP Y-VALUE OF A T.E. DISAGREES WITH PREVIOUS EDGCHK  00016
C                         L.E. TIP VALUE                                EDGCHK  00017
C                                                                       EDGCHK  00018
      DIMENSION XEDGE(1),YEDGE(1)                                       EDGCHK  00019
C                                                                       EDGCHK  00020
      IRR = 0                                                           EDGCHK  00021
      IF (YEDGE(1) .NE. 0. ) IRR = 4                                    EDGCHK  00022
      DO 100 I = 2,NEDGE                                                EDGCHK  00023
      IF (YEDGE(I) .LT. YEDGE(I-1) ) GO TO 150                          EDGCHK  00024
      GO TO (50,100), IEDGE                                             EDGCHK  00025
   50 IF (XEDGE(I) .LT. XEDGE(I-1) ) GO TO 200                          EDGCHK  00026
  100 CONTINUE                                                          EDGCHK  00027
      GO TO 250                                                         EDGCHK  00028
  150 IRR = IRR + 1                                                     EDGCHK  00029
      GO TO 250                                                         EDGCHK  00030
  200 IRR = IRR + 2                                                     EDGCHK  00031
  250 CONTINUE                                                          EDGCHK  00032
      GO TO (300,350),IEDGE                                             EDGCHK  00033
  300 YTIP = YEDGE(NEDGE)                                               EDGCHK  00034
      GO TO 500                                                         EDGCHK  00035
  350 IF (YEDGE(NEDGE) .NE. YTIP) IRR = IRR + 8                         EDGCHK  00036
C                                                                       EDGCHK  00037
  500 RETURN                                                            EDGCHK  00038
C                                                                       EDGCHK  00039
      END                                                               EDGCHK  00040
```

```
      IB = IB + 1                                                    DCODER  00055
 1000 CONTINUE                                                       DCODER  00056
      GO TO 3000                                                     DCODER  00057
C                                                                    DCODER  00058
C         PROGRAM WILL RETRIEVE NJ BOXES FROM CHORD J                DCODER  00059
 1100 CONTINUE                                                       DCODER  00060
      JSB  = (J-1)/NBWRD + 1                                         DCODER  00061
      JB = (NBWRD - MOD(J,NBWRD) ) * 3                               DCODER  00062
      IF (JB .EQ. 60) JB = 0                                         DCODER  00063
      IJMASK = SHIFT(MASK,JB)                                        DCODER  00064
      NJB = -JB                                                      DCODER  00065
      DO 2000 II = I,IEND,ISKIP                                      DCODER  00066
      IJWORD = IBOX(II,JSB)                                          DCODER  00067
      IJCODE = IJWORD.AND.IJMASK                                     DCODER  00068
      ICODE(IB) = SHIFT(IJCODE,NJB)                                  DCODER  00069
      IB = IB + 1                                                    DCODER  00070
 2000 CONTINUE                                                       DCODER  00071
C                                                                    DCODER  00072
 3000 CONTINUE                                                       DCODER  00073
      RETURN                                                         DCODER  00074
      END                                                            DCODER  00075
```

```
      SUBROUTINE NCODER(IBOX,LBOX, IA,JA, IL, ICODE )                    NCODER  00002
      DIMENSION IBOX(LBOX,1)                                             NCODER  00003
C                                                                        NCODER  00004
C        ENCODES ONE INTEGER BOX CODE INTO THE PACKED CODE ARRAY ALONG A  NCODER  00005
C        PORTION OF A CHORD, REPLACING PREVIOUS VALUES                   NCODER  00006
C                                                                        NCODER  00007
C          IBOX   - ARRAY OF BOX CODES,PACKED 20 PER WORD                NCODER  00008
C          LBOX   - ROW DIMENSION OF BOX CODES ARRAY                     NCODER  00009
C          IA     - I-TH INDEX OF FIRST BOX CODE TO SET                  NCODER  00010
C          JA     - J-TH INDEX OF FIRST BOX CODE TO SET                  NCODER  00011
C          IL     - I-TH INDEX OF THE LAST BOX CODE TO SET               NCODER  00012
C          ICODE  - CODE VALUE, 1,2, OR 3, FOR THE                       NCODER  00013
C                                                                        NCODER  00014
      INTEGER SHIFT                                                      NCODER  00015
      DATA MASK / 77777777777777777700B /                                NCODER  00016
      DATA NBWRD /20/                                                    NCODER  00017
      JSB = (JA-1)/NBWRD + 1                                             NCODER  00018
      JB = (NBWRD - MOD(JA,NBWRD) ) * 3                                  NCODER  00019
      IF (JB .EQ. 60) JB = 0                                             NCODER  00020
C         JB  =  A LEFT SHIFT COUNT                                      NCODER  00021
      ICOD  = SHIFT(ICODE,JB)                                            NCODER  00022
      IJMASK = SHIFT(MASK,JB)                                            NCODER  00023
      DO 100 II = IA,IL                                                  NCODER  00024
      IJCODE = IJMASK .AND. IBOX(II,JSB)                                 NCODER  00025
  100 IBOX(II,JSB) = IJCODE .OR. ICOD                                    NCODER  00026
      RETURN                                                             NCODER  00027
      END                                                                NCODER  00028
```

```
      SUBROUTINE PRNTBC(IBOX,LBXCD, IFRST,ILAST, JLAST, SUBD)            PRNTBC  00002
      DIMENSION IBOX(LBXCD,1),ICODE(150)                                 PRNTBC  00003
      LOGICAL SUBD                                                       PRNTBC  00004
C                                                                        PRNTBC  00005
C         PRINTS BOX CODES, SUBDIVIDED OR UNSUBDIVIDED                   PRNTBC  00006
C         IBOX   - COMPRESSED BOX CODE ARRAY                             PRNTBC  00007
C         LBXCD  - ROW DIMENSION OF BOX CODE ARRAY                       PRNTBC  00008
C         IFRST  - FIRST ROW DESIRED TO PRINT                            PRNTBC  00009
C         ILAST  - LAST ROW DESIRED                                      PRNTBC  00010
C         JLAST  - LAST CHORD DESIRED  (FIRST IS ALWAYS ONE)             PRNTBC  00011
C         SUBD   - .T., SUBDIVIDED CODES DESIRED                         PRNTBC  00012
C                  .F., UNSUBDIVIDED CODES DESIRED                       PRNTBC  00013
C                                                                        PRNTBC  00014
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,          GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,              GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,         GEOMTY  00004
     3                IXBW,XCENTR                                       GEOMTY  00005
      LOGICAL COPLAN                                                     GEOMTY  00006
      COMMON /CONTRL/ PREVEX,OMACH, TITLE(8), PRVGEOM,PRVMODE,DIHW,DIHT, CONTRL  00002
     1               DEFAULT                                           CONTRL  00003
      LOGICAL    PRVGEOM,PRVMODE,DIHW,DIHT,DEFAULT                       CONTRL  00004
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,     PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                               PROBLM  00003
      LOGICAL         SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                  PROBLM  00004
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,          FILES   00002
     1                ICUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC          FILES   00003
      DIMENSION BCD(4)                                                   PRNTBC  00020
      INTEGER BCD                                                        PRNTBC  00021
      DATA BCD/ 1H ,1H1,1H2,1H3  /                                       PRNTBC  00022
      DATA NBWRD /20 /                                                   FTN001  00040
 6001 FORMAT(1H1, 5X,8A10/1HO,20X,16HBOX CODE PATTERN )                  PRNTBC  00023
 6002 FORMAT(19X,20HFOR SUBDIVIDED BOXES,25X, 6HIXBW =,I2,11H  (SUBDIVID PRNTBC  00024
     1  30HED ROW OF UNSUBDIVIDED CENTER)  )                            PRNTBC  00025
 6005 FORMAT(22X,4HMACH,F11.7,56X,*CODE - 1 = PLANFORM BOX* /            PRNTBC  00026
     1 19X,20(1H-),61X,*2 = DIAPHRAGM BOX* /100X,*3 = WAKE BOX * )       PRNTBC  00027
 6010 FORMAT(1HO,4X,31I4 / ( 9X,30I4) )                                  PRNTBC  00028
 6012 FORMAT(1H )                                                        PRNTBC  00029
 6020 FORMAT(1X,I3,2X,63A2 / (12X,60A2) )                                PRNTBC  00030
C                                                                        PRNTBC  00031
      WRITE (NT6,6001) TITLE                                             PRNTBC  00032
      IF (NSUBDV .EQ. 1) GO TO 100                                       PRNTBC  00033
      IF (.NOT.SUBD) GO TO 100                                           PRNTBC  00034
      WRITE (NT6,6002) IXBW                                              PRNTBC  00035
  100 CONTINUE                                                           PRNTBC  00036
      WRITE (NT6,6005) XMACH                                             PRNTBC  00037
C                                                                        PRNTBC  00038
      WRITE (NT6,6010) (I, I=2,JLAST,2)                                  PRNTBC  00039
      WRITE (NT6,6012)                                                   PRNTBC  00040
      DO 250 IROW = IFRST,ILAST                                          PRNTBC  00041
      CALL DCODER(IBOX,LBXCD, IROW,1, IROW,JLAST, SUBD, ICODE )          PRNTBC  00042
C                                                                        PRNTBC  00043
C         CHANGE INTEGER CODES TO ALPHANUMERIC                           PRNTBC  00044
C                                                                        PRNTBC  00045
      DO 200 J= 1,JLAST                                                  PRNTBC  00046
      IF(ICODE(J).EQ.0) ICODE(J) = BCD(1)                                PRNTBC  00047
      IF(ICODE(J).EQ.1) ICODE(J) = BCD(2)                                PRNTBC  00048
      IF(ICODE(J).EQ.2) ICODE(J) = BCD(3)                                PRNTBC  00049
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      IF(ICODE(J).EQ.3) ICODE(J) =BCD(4)                                PRNTBC  00050
  200 CONTINUE                                                          PRNTBC  00051
      WRITE (NT6,6020) IROW, (ICODE(J), J = 1,JLAST )                   PRNTBC  00052
  250 CONTINUE                                                          PRNTBC  00053
      RETURN                                                            PRNTBC  00054
      END                                                               PRNTBC  00055
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      SUBROUTINE BXCDPF(XLE,YLE,NLE,XTE,YTE,NTE, LSROWS,IBOX )          BXCDPF  00002
C                                                                       BXCDPF  00003
C         GENERATES THE BOX CODES FOR THE ON-PLANFORM BOXES OF ONE      BXCDPF  00004
C         SURFACE.                                                      BXCDPF  00005
C           INPUT PARAMETERS                                            BXCDPF  00006
C              XLE    = X-VALUES, LEADING EDGE, NON-DIMENSIONAL         BXCDPF  00007
C              YLE    = Y-VALUES, LEADING EDGE                          BXCDPF  00008
C              NLE    = NUMBER OF LEADING EDGE POINTS                   BXCDPF  00009
C              XTE    = X-VALUES, TRAILING EDGE                         BXCDPF  00010
C              YTE    = Y-VALUES, TRAILING EDGE                         BXCDPF  00011
C              NTE    = NUMBER OF TRAILING EDGE POINTS                  BXCDPF  00012
C              LSROWS = MAXIMUM NUMBER OF SUBDIVIDED ROWS ALLOWED       BXCDPF  00013
C                                                                       BXCDPF  00014
C           OUTPUT PARAMETERS                                           BXCDPF  00015
C                                                                       BXCDPF  00016
C              IBOX   = COMPRESSED BOX CODES, SET 1 FOR PLANFORM BOXES, BXCDPF  00017
C                       UNCHANGED ELSEWHERE                             BXCDPF  00018
C                                                                       BXCDPF  00019
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,         FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC          FILES   00003
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,         GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,              GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,         GEOMTY  00004
     3                IXBW,XCENTR                                       GEOMTY  00005
      LOGICAL COPLAN                                                    GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,MXBT,MYBT,MYBBT,MXBST,MYBST,       GEOM2   00002
     1                MYBBST,IXBT,IXBST,CAPL                            GEOM2   00003
      COMMON /EDGES / FEXLOC(250), TEXLOC(250),JDIAG                    EDGES   00002
C                                                                       BXCDPF  00024
      LOGICAL WING                                                      BXCDPF  00025
      DIMENSION XLE(1),YLE(1),XTE(1),YTE(1)                             BXCDPF  00026
      DIMENSION IBOX(LSROWS,1)                                          BXCDPF  00027
C                                                                       BXCDPF  00028
C           INPUT COMMON PARAMETERS -                                   BXCDPF  00029
C              IXBT   = SUBDIVIDED ROW OF FIRST UNSUBDIVIDED BOX ON TAIL BXCDPF  00030
C              NSUBDV = (INTEGER) NUMBER OF SUBDIVISIONS                BXCDPF  00031
C              XSUBDV   (REAL)                                          BXCDPF  00032
C              NSUB2  = NSUBDV/2                                        BXCDPF  00033
C              NSUBCN = NSUBDV/2 +1 , CENTER SUBDIVIDED BOX             BXCDPF  00034
C                                                                       BXCDPF  00035
C           IN/OUT COMMON PARAMETERS -                                  BXCDPF  00036
C              IXBW   = 0, WING BEING DONE, CHANGED TO SUBDIVIDED ROW   BXCDPF  00037
C                         OF FIRST UNSUBDIVIDED BOX CENTER ON WING      BXCDPF  00038
C                       .NE. 0, TAIL BEING DONE, NOT CHANGED            BXCDPF  00039
C                                                                       BXCDPF  00040
C           OUTPUT COMMON PARAMETERS -                                  BXCDPF  00041
C              MXBSW  = NUMBER OF SUBDIVIDED ROWS TO AFT END OF (WING)  BXCDPF  00042
C              MXBST                                          (TAIL)    BXCDPF  00043
C              MYBSW  = NUMBER OF SUBDIVIDED CHORDS ON THE (WING)       BXCDPF  00044
C              MYBST                                        (TAIL)      BXCDPF  00045
C              MXBW   = NUMBER OF UNSUBDIVIDED ROWS ON (WING)           BXCDPF  00046
C              MXBT                                       (TAIL)        BXCDPF  00047
C              MYBW   = NUMBER OF UNSUBDIVIDED CHORDS ON THE (WING)     BXCDPF  00048
C              MYBT                                         (TAIL)     BXCDPF  00049
C              FEXLOC = ARRAY OF (LEADING)  EDGE X-LOCATIONS, SUBDIVIDED BXCDPF  00050
C              TEXLOC           (TRAILING)                              BXCDPF  00051
C                                                                       BXCDPF  00052
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      MYBS = 0                                                          BXCDPF  00053
      DEL = 1.0/XSUBDV                                                  BXCDPF  00054
C         LOCATION OF FIRST CHORD                                       BXCDPF  00055
      YMIN = .5*(1.0 + DEL)                                             BXCDPF  00056
C         SLOPES OF FIRST LEADING AND TRAILING EDGE SEGMENTS            BXCDPF  00057
      XREFLE = XLE(1)                                                   BXCDPF  00058
      YREFLE = YLE(1)                                                   BXCDPF  00059
      XREFTE = XTE(1)                                                   BXCDPF  00060
      YREFTE = YTE(1)                                                   BXCDPF  00061
      DELE   = (XLE(2)-XREFLE) / (YLE(2)-YREFLE)                        BXCDPF  00062
      DELTE  = (XTE(2)-XREFTE) / (YTE(2)-YREFTE)                        BXCDPF  00063
      ILE = 2                                                           BXCDPF  00064
      ITE = 2                                                           BXCDPF  00065
      IERR = 0                                                          BXCDPF  00066
C                                                                       BXCDPF  00067
C         WAS THIS CALL FOR WING OR TAIL -                              BXCDPF  00068
      IF (IXBW .EQ. 0) GO TO 120                                        BXCDPF  00069
C         SET UP COUNTERS FOR TAIL                                      BXCDPF  00070
      SURF = 4HTAIL                                                     BXCDPF  00071
      WING = .F.                                                        BXCDPF  00072
      MYBT   = IFIX(YLE(NLE))                                           BXCDPF  00073
      NSCHRD = MYBT * NSUBDV                                            BXCDPF  00074
      JEXLOC = MYBW * NSUBDV + 1                                        BXCDPF  00075
      IXB = IXBST                                                       BXCDPF  00076
      LSRR = LSROWS                                                     BXCDPF  00077
      IF (.NOT. COPLAN) LSRR = LSRR + IXBST - 1                         BXCDPF  00078
      GO TO 130                                                         BXCDPF  00079
C                                                                       BXCDPF  00080
C         SET UP COUNTERS FOR WING                                      BXCDPF  00081
  120 CONTINUE                                                          BXCDPF  00082
      SURF = 4HWING                                                     BXCDPF  00083
      WING = .T.                                                        BXCDPF  00084
      NSCHRD = MYBW * NSUBDV                                            BXCDPF  00085
      JEXLOC = 1                                                        BXCDPF  00086
      XMIN = XREFLE + (YMIN-YREFLE)*DELE                                BXCDPF  00087
      IXBW = (1.-XMIN)*XSUBDV + 1                                       BXCDPF  00088
      IXB  = 1                                                          BXCDPF  00089
      LSRR = LSROWS                                                     BXCDPF  00090
C                                                                       BXCDPF  00091
C         START LOOP ON SUBDIVIDED CHORDS                               BXCDPF  00092
  130 CONTINUE                                                          BXCDPF  00093
      YCHORD = YMIN                                                     BXCDPF  00094
      DO 350 JCHRD = 1,NSCHRD                                           BXCDPF  00095
C         FIND LEADING EDGE OF THIS CHORD                               BXCDPF  00096
  140 CONTINUE                                                          BXCDPF  00097
C         IS THE CURRENT L.E. SEGMENT STILL GOOD -                      BXCDPF  00098
      IF (YCHORD - YLE(ILE)) 160,170,150                                BXCDPF  00099
C         NO, ANOTHER SEGMENT IS NEEDED                                 BXCDPF  00100
  150 CONTINUE                                                          BXCDPF  00101
      YREFLE = YLE(ILE)                                                 BXCDPF  00102
      ILE = ILE + 1                                                     BXCDPF  00103
C         CHECK FOR EXCEEDING LIMIT                                     BXCDPF  00104
      IF  .LE .GT. NLE) GO TO 710                                       BXCDPF  00105
C         CHECK FOR EDGE SEGMENT PARALLEL TO (SKIP THE SEGMENT) OR      BXCDPF  00106
C         CUTTING BACK TOWARD CENTER-LINE (ERROR)                       BXCDPF  00107
      IF (YREFLE - YLE(ILE)) 160,150,730                                BXCDPF  00108
C         SEGMENT HAS POSITIVE SLOPE                                    BXCDPF  00109
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  160 XREFLE = XLE(ILE-1)                                                BXCDPF  00110
      DELE  = (XLE(ILE)-XREFLE) / (YLE(ILE) - YREFLE)                    BXCDPF  00111
      GO TO 140                                                          BXCDPF  00112
C                                                                        BXCDPF  00113
C         CHORD CENTER LIES ON SEGMENT ENDPOINT                          BXCDPF  00114
  170 CONTINUE                                                           BXCDPF  00115
      FEXLOC(JEXLOC) = (XLE(ILE)-1.0)*XSUBDV + IXBW                      BXCDPF  00116
      GO TO 190                                                          BXCDPF  00117
C                                                                        BXCDPF  00118
C         CHORD CENTER LIES WITHIN THE SEGMENT                           BXCDPF  00119
  180 CONTINUE                                                           BXCDPF  00120
      FEXLOC(JEXLOC) = ( XREFLE + DELE*(YCHORD-YREFLE) - 1.0 )*XSUBDV    BXCDPF  00121
     1     + IXBW                                                        BXCDPF  00122
C                                                                        BXCDPF  00123
  190 CONTINUE                                                           BXCDPF  00124
      FEXLOC(JEXLOC) = IFIX(FEXLOC(JEXLOC)) + .5                         BXCDPF  00125
      ISTART = FEXLOC(JEXLOC) + 1                                        BXCDPF  00126
C                                                                        BXCDPF  00127
C         THE FOLLOWING CODE FINDS THE TRAILING EDGE OF THIS CHORD IN    BXCDPF  00128
C         THE SAME MANNER AS ABOVE.                                      BXCDPF  00129
  240 CONTINUE                                                           BXCDPF  00130
      IF (YCHORD - YTE(ITE)) 280,270,250                                 BXCDPF  00131
  250 CONTINUE                                                           BXCDPF  00132
      YREFTE = YTE(ITE)                                                  BXCDPF  00133
      ITE = ITE + 1                                                      BXCDPF  00134
      IF (ITE .GT. NTE) GO TO 720                                        BXCDPF  00135
      IF (YREFTE - YTE(ITE)) 260,250,740                                 BXCDPF  00136
  260 XREFTE = XTE(ITE-1)                                                BXCDPF  00137
      DELTE = (XTE(ITE)-XREFTE) / (YTE(ITE)-YREFTE)                      BXCDPF  00138
      GO TO 240                                                          BXCDPF  00139
  270 CONTINUE                                                           BXCDPF  00140
      TEXLOC(JEXLOC) = (XTE(ITE)-1.0)*XSUBDV + IXBW                      BXCDPF  00141
      GO TO 290                                                          BXCDPF  00142
  280 CONTINUE                                                           BXCDPF  00143
      TEXLOC(JEXLOC) = ( XREFTE + DELTE*(YCHORD-YREFTE) - 1.0 )*XSUBDV   BXCDPF  00144
     1     + IXBW                                                        BXCDPF  00145
  290 CONTINUE                                                           BXCDPF  00146
      TEXLOC(JEXLOC) = IFIX(TEXLOC(JEXLOC)) + .5                         BXCDPF  00147
      IEND = TEXLOC(JEXLOC)                                              BXCDPF  00148
      IF (IEND .GT. LSRR) GO TO 770                                      BXCDPF  00149
C                                                                        BXCDPF  00150
C         SET BOX CODES TO 1 FOR PLANFORM BOXES OF THIS CHORD            BXCDPF  00151
  300 CONTINUE                                                           BXCDPF  00152
      CALL NCODER(IBOX,LSROWS, ISTART, JCHRD, IEND, 1 )                  BXCDPF  00153
C                                                                        BXCDPF  00154
      MXBS = MAXO(MXBS,IEND)                                             BXCDPF  00155
      JEXLOC = JEXLOC+1                                                  BXCDPF  00156
      YCHORD = YCHORD + DEL                                              BXCDPF  00157
  350 CONTINUE                                                           BXCDPF  00158
C         END OF LOOP ON CHORDS                                          BXCDPF  00159
C                                                                        BXCDPF  00160
      IF (WING) GO TO 360                                                BXCDPF  00161
      MXBST = MXBS                                                       BXCDPF  00162
      MYBST = (MXBS-IXBW)/NSUBDV + 1                                     BXCDPF  00163
      MYBST = NSCHRD                                                     BXCDPF  00164
      GO TO 370                                                          BXCDPF  00165
  360 MXBSW = MXBS                                                       BXCDPF  00166
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      MXBW = (MXBS-IXBW)/NSUBDV + 1                                    BXCDPF  00167
      MYBSW = NSCHRD                                                   BXCDPF  00168
  370 CONTINUE                                                         BXCDPF  00169
      IF (IERR .NE. 0) GO TO 750                                       BXCDPF  00170
C                                                                      BXCDPF  00171
      RETURN                                                           BXCDPF  00172
C                                                                      BXCDPF  00173
C         ERROR DIAGOSTICS                                             BXCDPF  00174
C                                                                      BXCDPF  00175
C         LIMIT EXCEEDED                                               BXCDPF  00176
  710 IERR = 1                                                         BXCDPF  00177
      EDGE = 8H LEADING                                                BXCDPF  00178
      ISEC = ILE - 1                                                   BXCDPF  00179
      GO TO 750                                                        BXCDPF  00180
  720 IERR = 1                                                         BXCDPF  00181
      EDGE = 8HTRAILING                                                BXCDPF  00182
      ISEC = ITE - 1                                                   BXCDPF  00183
      GO TO 750                                                        BXCDPF  00184
C         BAD EDGE DEFINITION                                          BXCDPF  00185
  730 IERR = 2                                                         BXCDPF  00186
      EDGE = 8H LEADING                                                BXCDPF  00187
      ISEC = ILE - 1                                                   BXCDPF  00188
      GO TO 750                                                        BXCDPF  00189
  740 IERR = 2                                                         BXCDPF  00190
      EDGE = 8HTRAILING                                                BXCDPF  00191
      ISEC = ITE - 1                                                   BXCDPF  00192
C                                                                      BXCDPF  00193
  750 CONTINUE                                                         BXCDPF  00194
      WRITE(NT6,7500) SURF, EDGE                                       BXCDPF  00195
 7500 FORMAT(22H0*** ERROR PROCESSING ,A5,10HGEOMETRY, ,A8, 9H EDGE ***) BXCDPF  00196
      GO TO (755,760,800) IERR                                         BXCDPF  00197
  755 WRITE(NT6,7550) ISEC                                             BXCDPF  00198
 7550 FORMAT(5X, 8HSECTION ,I2,24H IS BEYOND THOSE DEFINED )           BXCDPF  00199
      GO TO 800                                                        BXCDPF  00200
  760 WRITE(NT6,7600) ISEC                                             BXCDPF  00201
 7600 FORMAT(5X, 8HSECTION ,I2,36H OF THE EDGE DOUBLES BACK TOWARD THE BXCDPF  00202
     1  12H CENTER LINE )                                             BXCDPF  00203
      GO TO 800                                                        BXCDPF  00204
C         PLANFORM EXCEEDS BOX PATTERN LIMIT                           BXCDPF  00205
  770 CONTINUE                                                         BXCDPF  00206
      IERR = 3                                                         BXCDPF  00207
      EDGE = 8HTRAILING                                                BXCDPF  00208
      ISEC = ITE - 1                                                   BXCDPF  00209
      WRITE (NT6,7700) ISEC,SURF,JCHRD,IEND                            BXCDPF  00210
 7700 FORMAT(20H *** ERROR - SECTION,I3,29H OF THE TRAILING EDGE OF THE BXCDPF  00211
     1    A4,14H CAUSES CHORD I3,14H TO GO TO ROW I3,15H, WHICH EXCEEDS BXCDPF  00212
     2    14H THE LIMIT *** )                                         BXCDPF  00213
      IEND = LSROWS                                                    BXCDPF  00214
C         GO BACK TO FINISH THE SURFACE, THEN PRINT PLANFORM AND FLUSH BXCDPF  00215
      GO TO 300                                                        BXCDPF  00216
C                                                                      BXCDPF  00217
  800 CA   PRNTBC(IBOX,LSROWS, IXB,MXBS, NSCHRD, .T.)                 BXCDPF  00218
C                                                                      BXCDPF  00219
 8000 CALL FLUSH(1)                                                    BXCDPF  00220
C                                                                      BXCDPF  00221
      END                                                              BXCDPF  00222
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      SUBROUTINE BXCDI(IWAKE,LSROWS,LSCHDS,IBOX)                        BXCDI   00002
      DIMENSION IWAKE(1),IBOX(LSROWS,1)                                 BXCDI   00003
C                                                                       BXCDI   00004
C         DETERMINES BOX CODES FOR DIAPHRAGM REGIONS                    BXCDI   00005
C                                                                       BXCDI   00006
C         IWAKE   - ARRAY OF WAKE LIMITS, AS DICTATED BY A TAIL SURFACE BXCDI   00007
C         LSROWS  - ROW DIMENSION OF THE BOX CODE ARRAY                 BXCDI   00008
C         LSCHDS  - MAXIMUM NUMBER OF BOX CODES ALLOWED PER ROW         BXCDI   00009
C         IBOX    - BOX CODE ARRAY, COMPRESSED TO 20 CODES PER WORD     BXCDI   00010
C                                                                       BXCDI   00011
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,         FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC         FILES   00003
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,         GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,              GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,         GEOMTY  00004
     3                IXBW,XCENTR                                       GEOMTY  00005
      LOGICAL COPLAN                                                    GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSI7,MXBT,MYBT,MYBBT,MXBST,MYBST,      GEOM2   00002
     1                MYBBST,IXB',IXBST,CAPL                            GEOM2   00003
      COMMON /SAMPLW/ ISMPLW,ICHORD(10),IBOXF(10),IBOXL(10),ZLOC(10)    SAMPLW  00002
C         COMMON INPUT VALUES-                                          BXCDI   00015
C              MXBBSW, MXBBST,IXBST, MYBSW,MYBST,MYBBSW,MYBBST, NSUBDV  BXCDI   00016
C              ISMPLW                                                   BXCDI   00017
C         COMMON OUTPUT VALUES-                                         BXCDI   00018
C              MYBBSW, MYBBST, MYBBW,MYBBT                              BXCDI   00019
      DIMENSION ICODE(160)                                              BXCDI   00020
      LOGICAL WING                                                      BXCDI   00021
C                                                                       BXCDI   00022
C         DETERMINE WHETHER THIS IS A WING OR TAIL                      BXCDI   00023
      IF (IWAKE(1) .EQ. 0) GO TO 80                                     BXCDI   00024
      WING = .T.                                                        BXCDI   00025
      IXBS = 1                                                          BXCDI   00026
      IXBS1 = 2                                                         BXCDI   00027
      MXBBS = MXBBW+NSUBDV + IXBW - NSUBCN                              BXCDI   00028
      IF (COPLAN) MXBBS = MXBST                                         BXCDI   00029
      JEXLOC = 1                                                        BXCDI   00030
      MYBBS = MYBBSW                                                    BXCDI   00031
      MYBS  = MYBSW                                                     BXCDI   00032
      GO TO 100                                                         BXCDI   00033
C         THIS IS A TAIL SURFACE                                        BXCDI   00034
   80 WING = .F.                                                        BXCDI   00035
      IXBS = IXBST                                                      BXCDI   00036
      IXBS1 = IXBS + 1                                                  BXCDI   00037
      MXBBS = MXBST                                                     BXCDI   00038
      JEXLOC = MYBSW + 1                                                BXCDI   00039
      MYBBS = MYBBST                                                    BXCDI   00040
      MYBS  = MYBST                                                     BXCDI   00041
  100 CONTINUE                                                          BXCDI   00042
      MXBBS1 = MXBBS-1                                                  BXCDI   00043
C                                                                       BXCDI   00044
C         DETERMINE LEADING EDGE DIAPHRAGM                              BXCDI   00045
      DO 130 J = 2,MYBS                                                 BXCDI   00046
      CALL DCODER(IBOX,LSROWS, IXBS,J-1, IXBS1,J-1, .T., ICODE(2) )     BCSGEB  00001
      DO 120 I = IXBS1,MXBBS1                                           BXCDI   00048
      CALL DCODER(IBOX,LSROWS, I,J,   I,J,   .T., ICOD )               BXCDI   00049
      ICODE(1) = ICODE(2)                                               BXCDI   00050
      ICODE(2) = ICODE(3)                                               BXCDI   00051
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      CALL DCODER(IBOX,LSROWS, I+1,J-1, I+1,J-1, .T., ICODE(3))          BXCDI  00052
      IF (ICOD .NE. 0) GO TO 120                                         BXCDI  00053
      IF (ICODE(1) .EQ. 0 .OR. ICODE(3) .EQ. 0) GO TO 120                BXCDI  00054
      CALL NCODER(IBOX,LSROWS, I,J, I, 2 )                               BXCDI  00055
  120 CONTINUE                                                           BXCDI  00056
  130 CONTINUE                                                           BXCDI  00057
C         END OF DOUBLE LOOP TO DETERMINE LEADING EDGE DIAPHRAGM AREAS    BXCDI  00058
C                                                                        BXCDI  00059
C         DETERMINE TRAILING EDGE (WAKE) DIAPHRAGM                       BXCDI  00060
      IWK = 0                                                            BXCDI  00061
      DO 160 J = 1,MYBS                                                  BXCDI  00062
      IF (WING) IWK = IWAKE(J)                                           BXCDI  00063
      CALL DCODER(IBOX,LSROWS, IXBS,J, IXBS,J, .T., ICOD)                BXCDI  00064
      DO 170 I = IXBS1,MXBBS                                             BXCDI  00065
      ICODM1 = ICOD                                                      BXCDI  00066
      CALL DCODER(IBOX,LSROWS, I,J, I,J, .T., ICOD)                      BXCDI  00067
      IF (ICOD .EQ. 1) GO TO 170                                         BXCDI  00068
      IF (ICODM1 .NE. 1 .AND. ICODM1 .NE. 3) GO TO 170                   BXCDI  00069
      IF (I .LE. IWK) GO TO 160                                          BXCDI  00070
      IF (I .EQ. MXBBS) GO TO 180                                        BXCDI  00071
C         THE BOX IS A CANDIDATE.  SEARCH DIAGONALLY FOR POSSIBLE        BXCDI  00072
C         RECEIVING BOXES DOWNSTREAM.                                    BXCDI  00073
      JP = J                                                             BXCDI  00074
      JM = J                                                             BXCDI  00075
      IS = I+1                                                           BXCDI  00076
      DO 150 II = IS,MXBBS                                               BXCDI  00077
      IF (JM .GT. 1) JM = JM - 1                                         BXCDI  00078
      CALL DCODER(IBOX,LSROWS, II,JM, II,JM, .T., ICOD )                 BXCDI  00079
      IF (ICOD .NE. 0) GO TO 160                                         BXCDI  00080
      IF (JP .GE. MYBBS) GO TO 150                                       BXCDI  00081
      JP = JP + 1                                                        BXCDI  00082
      CALL DCODER(IBOX,LSROWS, II,JP, II,JP, .T., ICOD )                 BXCDI  00083
      IF (ICOD .NE. 0) GO TO 160                                         BXCDI  00084
      IF (.NOT. WING)  GO TO 150                                         BXCDI  00085
      IF ( II .LE. IWAKE(JM) ) GO TO 160                                 BXCDI  00086
      IF ( II .LE. IWAKE(JP) ) GO TO 160                                 BXCDI  00087
  150 CONTINUE                                                           BXCDI  00088
C         END OF LOOP ON DIAGONAL SEARCH                                 BXCDI  00089
      GO TO 170                                                          BXCDI  00090
C                                                                        BXCDI  00091
C         CONDITIONS HAVE BEEN FOUND FOR A VALID WAKE BOX                BXCDI  00092
  160 CONTINUE                                                           BXCDI  00093
      CALL NCODER(IBOX,LSROWS, I,J, I, 3 )                               BXCDI  00094
      ICOD = 3                                                           BXCDI  00095
  170 CONTINUE                                                           BXCDI  00096
C         END OF LOOP ON ROWS, AND                                       BXCDI  00097
  180 CONTINUE                                                           BXCDI  00098
C         END OF LOOP ON CHORDS, FOR WAKE DIAPHRAGM, FROM 130*           BXCDI  00099
C                                                                        BXCDI  00100
C         DETERMINE THE TIP DIAPHRAGM REGION                             BXCDI  00101
      LBB = 2                                                            BXCDI  00102
      DO 300 I = IXBS1,MXBBS1                                            BXCDI  00103
C         SEARCH FOR LAST NON-ZERO BOX CODE ON THE ROW, FROM LBB OUTWARD BXCDI  00104
      CALL DCODER(IBOX,LSROWS, I,LBB, I,MYBBS,  .T., ICODE(LBB) )        BXCDI  00105
  200 LBB  = LBB+1                                                       BXCDI  00106
      DO 2 ) J = LBBP1,MYBBS                                             BXCDI  00107
      IF (ICODE(J) .EQ. 0) GO TO 220                                     BXCDI  00108
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  210 CONTINUE                                                          BXCDI   00109
      LBB = MYBBS                                                       BXCDI   00110
      GO TO 225                                                         BXCDI   00111
  220 LBB = J - 1                                                       BXCDI   00112
C         LBB  = THE SUBSCRIPT OF THE LAST NON-ZERO BOX ON THE ROW      BXCDI   00113
C         TEST BOX DIRECTLY AHEAD FOR NON-ZERO VALUE                    BXCDI   00114
  225 CONTINUE                                                          BXCDI   00115
      CALL DCODER(IBOX,LSROWS, I-1,LBB, I-1,LBB, .T., ICOD)            BXCDI   00116
      IF (ICOD .EQ. 0) GO TO 280                                        BXCDI   00117
C         SEARCH FOR A NON-ZERO CODE ON THE INBOARD DIAGONAL AFT        BXCDI   00118
      J = LBB                                                           BXCDI   00119
      IP1 = I + 1                                                       BXCDI   00120
      IF (IP1 .GT. MXBBS) GO TO 310                                     BXCDI   00121
      DO 230 II = IP1,MXBBS                                             BXCDI   00122
      CALL DCODER(IBOX,LSROWS, II,J, II,J, .T.,  ICOD)                  BXCDI   00123
      IF (ICOD .NE. 0) GO TO 255                                        BXCDI   00124
      J = J - 1                                                         BXCDI   00125
  230 CONTINUE                                                          BXCDI   00126
C                                                                       BXCDI   00127
C         NO DIAGONAL BOX WAS FOUND                                     BXCDI   00128
      IF (NSURF .EQ. 1 .AND. ISMPLW .EQ. 0) GO TO 310                   BXCDI   00129
      IF (.NOT. WING) GO TO 310                                         BXCDI   00130
C         SEARCH BACK ALONG THE DIAGONAL FOR  A  DIAPHRAGM REGION       BXCDI   00131
C         CAUSED BY A TAIL SURFACE                                      BXCDI   00132
      II  = MXBBS + 1                                                   BXCDI   00133
      DO 240 III = IP1,MXBBS                                            BXCDI   00134
      II  =  II - 1                                                     BXCDI   00135
      J = J + 1                                                         BXCDI   00136
      IF (IWAKE(J) .GE. II ) GO TO 250                                  BXCDI   00137
  240 CONTINUE                                                          BXCDI   00138
C         NO DIAPHRAGM FOUND                                            BXCDI   00139
      GO TO 310                                                         BXCDI   00140
C                                                                       BXCDI   00141
C         CONDITION FOUND REQUIRING DIAPHRAGM BOXES ON THE DIAGONAL.    BXCDI   00142
  250 JJ = J                                                            BXCDI   00143
      GO TO 260                                                         BXCDI   00144
  255 JJ = J + 1                                                        BXCDI   00145
      II = II - 1                                                       BXCDI   00146
  260 CONTINUE                                                          BXCDI   00147
C         TEST FOR EXCEEDING BOX CODE ARRAY                             BXCDI   00148
      LBB = LBB + 1                                                     BXCDI   00149
      IF (LBB .GT. LSCHDS) GO TO 8500                                   BXCDI   00150
C         SET DIAGONAL ELEMENTS                                         BXCDI   00151
      DO 270 J = JJ,LBB                                                 BXCDI   00152
      CALL NCODER(IBOX,LSROWS, II,J, II, 2 )                            BXCDI   00153
      II = II - 1                                                       BXCDI   00154
  270 CONTINUE                                                          BXCDI   00155
      ICODE(LBB) = 2                                                    BXCDI   00156
      MYBBS = MAXO(MYBBS,LBB)                                           BXCDI   00157
      GO TO 200                                                         BXCDI   00158
C                                                                       BXCDI   00159
C         DETERMINE LAST NON-ZERO BOX ON NEXT ROW                       BXCDI   00160
  280 CONTINUE                                                          BXCDI   00161
      MYBBS = MAXO(MYBBS,LBB)                                           BXCDI   00162
      II = I + 1                                                        BXCDI   00163
      DO 290 K = 1,LBB                                                  BXCDI   00164
      J = LBB - K + 1                                                   BXCDI   00165
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      CALL DCODER(IBOX,LSROWS, II,J, II,J, .T., ICOD)                    BXCDI   00166
      IF (ICOD .NE. 0) GO TO 295                                         BXCDI   00167
  290 CONTINUE                                                           BXCDI   00168
      GO TO 300                                                          BXCDI   00169
  295 LBB = J                                                            BXCDI   00170
  300 CONTINUE                                                           BXCDI   00171
C         END OF LOOP ON ROWS DETERMINING TIP DIAPHRAGM CODES, FROM 180* BXCDI   00172
C                                                                        BXCDI   00173
  310 CONTINUE                                                           BXCDI   00174
      IF (WING) GO TO 350                                                BXCDI   00175
      MYBBST = MYBBS                                                     BXCDI   00176
      MYBBT  = (MYBBS+NSUBD2)/NSUBDV                                     BXCDI   00177
      GO TO 500                                                          BXCDI   00178
  350 MYBBSW = MYBBS                                                     BXCDI   00179
      MYBBW  = (MYBBS+NSUBD2)/NSUBDV                                     BXCDI   00180
      IF (.NOT. COPLAN) GO TO 500                                        BXCDI   00181
      MYBBST = MYBBSW                                                    BXCDI   00182
      MYBBT = MYBBW                                                      BXCDI   00183
C                                                                        BXCDI   00184
  500 RETURN                                                             BXCDI   00185
C                                                                        BXCDI   00186
 8500 WRITE (NT6,9500)                                                   BXCDI   00187
 9500 FORMAT(51H0*** ERROR - TOO MANY CHORDS FOR BOX CODE ARRAY *** )    BXCDI   00188
      CALL PRNTBC(IBOX,LSROWS,IX8S,MXBBS,MYBBS, .T. )                    BXCDI   00189
      CALL FLUSH(1)                                                      BXCDI   00190
C                                                                        BXCDI   00191
      END                                                                BXCDI   00192
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      SUBROUTINE GMAREA(IBOX,LBXCD, WING, ALPHA,IJALPH, NALPH)          GMAREA  00002
C                                                                       GMAREA  00003
C         IBOX   = ARRAY OF BOX TYPE CODES                              GMAREA  00004
C         LBXCD  = ROW DIMENSION OF BOX CODE ARRAY                      GMAREA  00005
C         WING   = PLANFORM INDICATOR                                   GMAREA  00006
C         ALPHA  = ARRAY OF ALPHAS (NORMALIZED AREAS)                   GMAREA  00007
C         IJALPH = SUBSCRIPTS FOR IBOX ARRAY OF CELLS THAT HAVE ALPHAS  GMAREA  00008
C                  NOT EQUAL TO 0.0 OR 1.0                              GMAREA  00009
C         NALPH  = NUMBER OF ALPHAS STORED                              GMAREA  00010
C                                                                       GMAREA  00011
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,         GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,             GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,        GEOMTY  00004
     3                IXBW,XCENTR                                      GEOMTY  00005
      LOGICAL COPLAN                                                    GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,MXBT,MYBT,MYBBT,MXBST,MYBST,      GEOM2   00002
     1                MYBBST,IXBT,IXBST,CAPL                           GEOM2   00003
      COMMON /PLANXY/ NWLE,NWTE,NTLE,NTTE, XWLE(10),YWLE(10),          PLANXY  00002
     1                XWTE(10),YWTE(10), XTLE(10),YTLE(10),            PLANXY  00003
     2                XTTE(10),YTTE(10)                                PLANXY  00004
      COMMON /EDGES / TEXLOC(250), TEXLOC(250),JDIAG                    EDGES   00002
C                                                                       GMAREA  00016
C            COMMON PARAMETERS USED                                     GMAREA  00017
C         MXB    = LENGTH OF BOX PATERN (X-DIRECTION)                   GMAREA  00018
C         MYB    = MAXIMUM ON-PLANFORM SPAN (Y-DIRECTION)               GMAREA  00019
C         COPLAN = .T., SECOND SURFACE EXISTS FOR PLANFORM              GMAREA  00020
C                = .F., SINGLE SURFACE                                  GMAREA  00021
C         NWLE   = NUMBER OF POINTS DEFINING LEADING EDGE OF THE WING   GMAREA  00022
C         NWTE   = NUMBER OF POINTS DEFINING TRAILING EDGE OF THE WING  GMAREA  00023
C         NTLE   = NUMBER OF POINTS DEFINING LEADING EDGE OF THE TAIL   GMAREA  00024
C         NTTE   = NUMBER OF POINTS DEFINING TRAILING EDGE OF THE TAIL  GMAREA  00025
C         XWLE   = X COORDINATE OF THE LEADING EDGE DEFINITION POINT    GMAREA  00026
C                  FOR THE FIRST PLANFORM                               GMAREA  00027
C         YWLE   = Y COORDINATE OF THE LEADING EDGE DEFINITION POINT    GMAREA  00028
C                  FOR THE FIRST PLANFORM                               GMAREA  00029
C         XWTE   = X COORDINATE OF THE TRAILING EDGE DEFINITION POINT   GMAREA  00030
C                  FOR THE FIRST PLANFORM                               GMAREA  00031
C         YWTE   = Y COORDINATE OF THE TRAILING EDGE DEFINITION POINT   GMAREA  00032
C                  FOR THE FIRST PLANFORM                               GMAREA  00033
C         XTLE   = X COORDINATE OF THE LEADING EDGE DEFINITION POINT    GMAREA  00034
C                  FOR THE SECOND PLANFORM                              GMAREA  00035
C         YTLE   = Y COORDINATE OF THE LEADING EDGE DEFINITION POINT    GMAREA  00036
C                  FOR THE SECOND PLANFORM                              GMAREA  00037
C         XTTE   = X COORDINATE OF THE TRAILING EDGE DEFINITION POINT   GMAREA  00038
C                  FOR THE SECOND PLANFORM                              GMAREA  00039
C         YTTE   = Y COORDINATE OF THE TRAILING EDGE DEFINITION POINT   GMAREA  00040
C                  FOR THE SECOND PLANFORM                              GMAREA  00041
C                                                                       GMAREA  00042
      COMMON /LAREA / LEFT,RIGHT,ICODE                                  LAREA   00002
      DIMENSION IBX(50)                                                 GMAREA  00044
      DIMENSION ALPHA(1), IJALPH(1)                                     GMAREA  00045
      LOGICAL WING                                                      GMAREA  00046
      REAL LIN1,LIN2,LIN3,LIN4,LEFT                                     GMAREA  00047
      NALPH = 1                                                         GMAREA  00048
      IF (WING) GO TO 5                                                 GMAREA  00049
      MYB = MYBT                                                        GMAREA  00050
      IXB = (IXBT-IXBW)/NSUBDV + 1                                      GMAREA  00051
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      MXB = MXBT                                                        GMAREA  00052
      CEN2 = 0.                                                         GMAREA  00053
      GO TO 8                                                           GMAREA  00054
    5 MYB = MYBW                                                        GMAREA  00055
      IF (COPLAN) MYB = MAXO(MYB,MYBT)                                  GMAREA  00056
      IXB = 1                                                           GMAREA  00057
      MXB = MXBW                                                        GMAREA  00058
      IF (COPLAN) MXB = MXBT                                            GMAREA  00059
    8 CONTINUE                                                          GMAREA  00060
C                                                                       GMAREA  00061
C         LOOP ON CHORDS                                                GMAREA  00062
      DO 90 J=1,MYB                                                     GMAREA  00063
      YJ = J                                                            GMAREA  00064
      RIGHT = YJ + 0.5                                                  GMAREA  00065
      LEFT  = YJ - 0.5                                                  GMAREA  00066
      IF (.NOT. WING) GO TO 110                                         GMAREA  00067
C                                                                       GMAREA  00068
C         CALL NTRCEP TO DETERMINE LEFT, RIGHT AND CENTER LINE          GMAREA  00069
C         INTERCEPTS, AND THE BREAK POINTS OF EDGES OVER THIS           GMAREA  00070
C         CHORD.                                                        GMAREA  00071
C                                                                       GMAREA  00072
      IF (YJ .GT. YWLE(NWLE) ) GO TO 10                                 GMAREA  00073
      CALL NTRCEP(J, YWLE,XWLE, LIN1,CEN1,RIN1,NBK1,KINK1, 1)           GMAREA  00074
      CALL NTRCEP(J, YWTE,XWTE, LIN2,CEN2,RIN2,NBK2,KINK2, 2)           GMAREA  00075
   10 IF (NSURF .EQ. 1 .OR. .NOT. COPLAN) GO TO 20                      GMAREA  00076
C     COMPUTE SLOPE AND INTERCEPTS FOR SECOND PLANFORM.                 GMAREA  00077
  110 IF (YJ .GT. YTLE(NTLE) ) GO TO 20                                 GMAREA  00078
      CALL NTRCEP(J, YTLE,XTLE, LIN3,CEN3,RIN3,NBK3,KINK3, 1)           GMAREA  00079
      CALL NTRCEP(J, YTTE,XTTE, LIN4,CEN4,RIN4,NBK4,KINK4, 2)           GMAREA  00080
   20 CONTINUE                                                          GMAREA  00081
C     SLOPE AND INTERVALS COMPLETED.                                    GMAREA  00082
C                                                                       GMAREA  00083
C     LOOP DOWN THE CHORD                                               GMAREA  00084
      CALL DCODER(IBOX,LBXCD, IXB,J, MXB,J, .F., IBX)                   GMAREA  00085
      II = 1                                                            GMAREA  00086
      DO 85 I=IXB,MXB                                                   GMAREA  00087
      XI = I                                                            GMAREA  00088
      IF(IBX(II) .NE. 1) GO TO 80                                       GMAREA  00089
      BOXLE = XI - 0.5                                                  GMAREA  00090
      BOXTE = XI + 0.5                                                  GMAREA  00091
      IF(.NOT.WING) GO TO 40                                            GMAREA  00092
      IF (YJ .GT. YWLE(NWLE) ) GO TO 40                                 GMAREA  00093
      IF (XI .GT.  CEN2)      GO TO 40                                  GMAREA  00094
C     BOX IS ON PLANFORM 1                                              GMAREA  00095
      ICODE =1                                                          GMAREA  00096
C         ICODE  = 1, 1ST L.E. BOX ON CHORD                             GMAREA  00097
C                = 2, LAST T.E. BOX ON CHORD                            GMAREA  00098
C                = 3, INTERNAL CUT BOX                                  GMAREA  00099
      IF(II .EQ. 1) GO TO 24                                            GMAREA  00100
      IF(IBX(II-1) .NE. 1) GO TO 24                                     GMAREA  00101
      ICODE =2                                                          GMAREA  00102
      IF (I.EQ.MXB) GO TO 24                                            GMAREA  00103
      IF    (II+1) .NE. 1) GO TO 24                                     GMAREA  00104
      IF(  .1. .GT.CEN2) GO TO 24                                       GMAREA  00105
      ICOD  =3                                                          GMAREA  00106
      IU=0                                                              GMAREA  00107
      IB=0                                                              GMAREA  00108
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      IF(RIN1.GT.BOXLE) IU=1                                              GMAREA  00109
      IF(RIN2.LT.BOXTE) IB=1                                              GMAREA  00110
      IF(LIN2.LT.BOXTE) IB=1                                              GMAREA  00111
      IF (IU+IB.EQ.0) GO TO 80                                            GMAREA  00112
C     BOX IS NOT ENTIRELY ON PLANFORM. COMPUTE AREA.                      GMAREA  00113
   24 CONTINUE                                                            GMAREA  00114
      CALL ALPHAC(XI,  XWLE,YWLE,XWTE,YWTE,                               GMAREA  00115
     1LIN1,CEN1,RIN1,NBK1,KINK1,LIN2,CEN2,RIN2,NBK2,KINK2,ALPHA(NALPH))   GMAREA  00116
      GO TO 75                                                            GMAREA  00117
C                                                                         GMAREA  00118
   40 CONTINUE                                                            GMAREA  00119
      IF (NSURF .EQ. 1) GO TO 80                                          GMAREA  00120
C     BOX IS ON PLANFORM 2.                                               GMAREA  00121
      ICODE =2                                                            GMAREA  00122
      IF(I.EQ.MXB) GO TO 44                                               GMAREA  00123
      ICODE = 1                                                           GMAREA  00124
      IF(XI-1. .LT.CEN3) GO TO 44                                         GMAREA  00125
      IF(IBX(II-1) .NE. 1) GO TO 44                                       GMAREA  00126
      ICODE =2                                                            GMAREA  00127
      IF(IBX(II+1) .NE. 1) GO TO 44                                       GMAREA  00128
      ICODE =3                                                            GMAREA  00129
      IU=0                                                                GMAREA  00130
      IB=0                                                                GMAREA  00131
      IF(RIN3.GT.BOXLE) IU=1                                              GMAREA  00132
      IF(RIN4.LT.BOXTE) IB=1                                              GMAREA  00133
      IF(LIN4.LT.BOXTE) IB=1                                              GMAREA  00134
      IF (IU+IB.EQ.0) GO TO 80                                            GMAREA  00135
C     BOX IS NOT ENTIRELY ON PLANFORM. COMPUTE AREA.                      GMAREA  00136
   44 CONTINUE                                                            GMAREA  00137
      CALL ALPHAC(XI,  XTLE,YTLE,XTTE,YTTE,                               GMAREA  00138
     1LIN3,CEN3,RIN3,NBK3,KINK3,LIN4,CEN4,RIN4,NBK4,KINK4,ALPHA(NALPH))   GMAREA  00139
   75 IJALPH(NALPH) = J*512 + I                                           GMAREA  00140
      NALPH = NALPH + 1                                                   GMAREA  00141
   80 CONTINUE                                                            GMAREA  00142
      II = II + 1                                                         GMAREA  00143
   85 CONTINUE                                                            GMAREA  00144
   90 CONTINUE                                                            GMAREA  00145
      NALPH = NALPH -1                                                    GMAREA  00146
      RETURN                                                              GMAREA  00147
      END                                                                 GMAREA  00148
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      SUBROUTINE ALPHAC(X,XLED,YLED,XTED,YTED,                          ALPHAC  00002
     1           L1,C1,R1,NBK1,K1,L2,C2,R2,NBK2,K2,AREA)                ALPHAC  00003
C                                                                       ALPHAC  00004
C         X      = X COORDINATE OF CELL CENTER                          ALPHAC  00005
C         L1     = X COORDINATE OF LEADING EDGE LEFT SIDE INTERSECTION  ALPHAC  00006
C         C1     = X COORDINATE OF LEADING EDGE CENTER LINE INTERSECTION ALPHAC  00007
C         R1     = X COORDINATE OF LEADING EDGE RIGHT SIDE INTERSECTION  ALPHAC  00008
C         K1     = FLAG TO INDICATE LEADING EDGE KINK                   ALPHAC  00009
C         L2     = X COORDINATE OF TRAILING EDGE LEFT SIDE INTERSECTION ALPHAC  00010
C         C2     = X COORDINATE OF TRAILING EDGE  ENTER LINE INTERSECT. ALPHAC  00011
C         R2     = X COORDINATE OF TRAILING EDGE RIGHT SIDE INTESECTION ALPHAC  00012
C         K2     = FLAG TO INDICATE TRAILING EDGE KINK                  ALPHAC  00013
C         AREA   = AREA COMPUTED FOR THE CELL                           ALPHAC  00014
C                                                                       ALPHAC  00015
      COMMON /LAREA / LEFT,RIGHT,ICODE                                  LAREA   00002
C         LEFT   = Y COORDINATE OF LEFT SIDE OF CHORD                   ALPHAC  00017
C         RIGHT  = Y COORDINATE OF RIGHT SIDE OF CHORD                  ALPHAC  00018
C         ICODE  = 1, 1ST L.E. BOX ON CHORD                             ALPHAC  00019
C                = 2, LAST T.E. BOX ON CHORD                            ALPHAC  00020
C                = 3, INTERNAL CUT BOX                                  ALPHAC  00021
C                                                                       ALPHAC  00022
      DIMENSION XC(6),  YC(6)                                           ALPHAC  00023
      DIMENSION XLED(1) ,YLED(1), XTED(1), YTED(1)                      ALPHAC  00024
      REAL LEFT, L1, L2                                                 ALPHAC  00025
      EPS = 1.0E-04                                                     ALPHAC  00026
      BOXLE = X-0.5                                                     ALPHAC  00027
      BOXTE = X + 0.5                                                   ALPHAC  00028
      XU = X - 1.0                                                      ALPHAC  00029
      XL = X + 1.0                                                      ALPHAC  00030
      AREA = 0.0                                                        ALPHAC  00031
      ISLICE = 0                                                        ALPHAC  00032
      IF (ICODE.EQ.3) GO TO 5000                                        ALPHAC  00033
      IF(C1.GT.XU.AND.C2.LT.XL) GO TO 3000                              ALPHAC  00034
 1110 IF(ICODE.EQ.1)   GO TO 1000                                       ALPHAC  00035
 1120 IF(ICODE.EQ.2) GO TO 2000                                         ALPHAC  00036
      GO TO 4000                                                        ALPHAC  00037
C                                                                       ALPHAC  00038
C         LEADING EDGE BOX                                              ALPHAC  00039
 1000 CONTINUE                                                          ALPHAC  00040
      NTRAPS = NBK1 + 1                                                 ALPHAC  00041
      NTM1 = NTRAPS - 1                                                 ALPHAC  00042
      NXC = NTRAPS + 1                                                  ALPHAC  00043
      XC(1) = L1                                                        ALPHAC  00044
      YC(1) = LEFT                                                      ALPHAC  00045
      XC(NXC) = R1                                                      ALPHAC  00046
      YC(NXC) = RIGHT                                                   ALPHAC  00047
      IF (NTRAPS.EQ.1) GO TO 110                                        ALPHAC  00048
      DO 100 NA=2,NTRAPS                                                ALPHAC  00049
      KIDX = K1+NA-2                                                    ALPHAC  00050
      XC(NA) = XLED(KIDX)                                               ALPHAC  00051
      YC(NA) = YLED(KIDX)                                               ALPHAC  00052
  100 CONTINUE                                                          ALPHAC  00053
  110 CONTINUE                                                          ALPHAC  00054
      DO 300 NX = 1,NTRAPS                                              ALPHAC  00055
      IF(XC(NX).GE.BOXTE) GO TO 300                                     ALPHAC  00056
      A = BOXTE -XC(NX)                                                 ALPHAC  00057
      DY = YC(NX+1) - YC(NX)                                            ALPHAC  00058
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      IF(DY.LT.EPS) GO TO 300                                          ALPHAC 00059
      IF(XC(NX+1).GT.BOXTE) GO TO 250                                  ALPHAC 00060
      B = BOXTE - XC(NX+1)                                             ALPHAC 00061
  200 AREA = AREA + 0.5*(A+B)*DY                                       ALPHAC 00062
      GO TO 300                                                        ALPHAC 00063
C                                                                      ALPHAC 00064
C         EDGE CROSSES BOXTE.  COMPUTE INTERSECTION FOR DY             ALPHAC 00065
  250 CONTINUE                                                         ALPHAC 00066
      B = 0.0                                                          ALPHAC 00067
      DX = XC(NX+1) - XC(NX)                                           ALPHAC 00068
      S = DY/DX                                                        ALPHAC 00069
      DY = S*A                                                         ALPHAC 00070
      GO TO 200                                                        ALPHAC 00071
  300 CONTINUE                                                         ALPHAC 00072
      IF (BOXTE-BOXLE.LT.EPS) GO TO 2000                               ALPHAC 00073
      IF(R2.LT.BOXTE) ISLICE =2                                        ALPHAC 00074
      IF(L2.LT.BOXTE) ISLICE =1                                        ALPHAC 00075
      IF(ISLICE.NE.0) GO TO 5000                                       ALPHAC 00076
      GO TO 4000                                                       ALPHAC 00077
C                                                                      ALPHAC 00078
C         TRAILING EDGE BOX                                            ALPHAC 00079
 2000 CONTINUE                                                         ALPHAC 00080
      NTRAPS =NBK2 + 1                                                 ALPHAC 00081
      NTM1 = NTRAPS- 1                                                 ALPHAC 00082
      NXC  = NTRAPS+ 1                                                 ALPHAC 00083
      XC(1)= L2                                                        ALPHAC 00084
      YC(1)= LEFT                                                      ALPHAC 00085
      XC(NXC)=R2                                                       ALPHAC 00086
      YC(NXC)=RIGHT                                                    ALPHAC 00087
      IF(NTRAPS.EQ.1) GO TO 2110                                       ALPHAC 00088
      DO 2100 NA = 2,NTRAPS                                            ALPHAC 00089
      KIDX = K2 + NA -2                                                ALPHAC 00090
      XC(NA) = XTED(KIDX)                                              ALPHAC 00091
      YC(NA) = YTED(KIDX)                                              ALPHAC 00092
 2100 CONTINUE                                                         ALPHAC 00093
 2110 CONTINUE                                                         ALPHAC 00094
      DO 2300 NX=1,NTRAPS                                              ALPHAC 00095
      IF(XC(NX).LT.BOXLE.AND.XC(NX+1).LT.BOXLE) GO TO 2300             ALPHAC 00096
      DY = YC(NX+1) - YC(NX)                                           ALPHAC 00097
      IF(DY.LT.EPS) GO TO 2300                                         ALPHAC 00098
      IF(XC(NX).LT.BOXLE.OR.XC(NX+1).LT.BOXLE)  GO TO 2250             ALPHAC 00099
C                                                                      ALPHAC 00100
C         DOES NOT INTERSECT BOXLE                                     ALPHAC 00101
      A = XC(NX) - BOXLE                                               ALPHAC 00102
      B = XC(NX+1) - BOXLE                                             ALPHAC 00103
 2225 AREA = AREA + 0.5*(A+B)*DY                                       ALPHAC 00104
      GO TO 2300                                                       ALPHAC 00105
C                                                                      ALPHAC 00106
C         INTERSECTS BOXLE                                             ALPHAC 00107
 2250 CONTINUE                                                         ALPHAC 00108
      DX = XC(NX+1) -XC(NX)                                            ALPHAC 00109
      S = DY/DX                                                        ALPHAC 00110
      A = BOXLE - XC(NX)                                               ALPHAC 00111
      YINT = YC(NX) + S*A                                              ALPHAC 00112
      IF(S.LT.0.0) GO TO 2275                                          ALPHAC 00113
C                                                                      ALPHAC 00114
C         SLOPE POSITIVE                                               ALPHAC 00115
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      A = 0                                                              ALPHAC  00116
      B = XC(NX+1) - BOXLE                                               ALPHAC  00117
      DY = YC(NX+1) - YINT                                               ALPHAC  00118
      GO TO 2225                                                         ALPHAC  00119
C                                                                        ALPHAC  00120
C       SLOPE NEGATIVE                                                   ALPHAC  00121
 2275 CONTINUE                                                           ALPHAC  00122
      A = -A                                                             ALPHAC  00123
      B = 0                                                              ALPHAC  00124
      DY = YINT - YC(NX)                                                 ALPHAC  00125
      GO TO 2225                                                         ALPHAC  00126
 2300 CONTINUE                                                           ALPHAC  00127
      IF(R1.LT.BOXLE) ISLICE =3                                          ALPHAC  00128
      IF(ISLICE.NE.0) GO TO 5000                                         ALPHAC  00129
      GO TO 4000                                                         ALPHAC  00130
C                                                                        ALPHAC  00131
C       CHORD HAS ONLY 1 BOX                                             ALPHAC  00132
 3000 CONTINUE                                                           ALPHAC  00133
      BOXLE = R1                                                         ALPHAC  00134
      BOXTE = R1                                                         ALPHAC  00135
      GO TO 1000                                                         ALPHAC  00136
C                                                                        ALPHAC  00137
C                                                                        ALPHAC  00138
C       THE FOLLOWING IS THE CALCULATIONS FOR A BOX WITH FORE AND        ALPHAC  00139
C       AFT BOXES ON PLANFORM. ONE OF 3 CORNER (L.L.,L.R., OR U.B.)      ALPHAC  00140
C       IS  CUT OFF.                                                     ALPHAC  00141
C                                                                        ALPHAC  00142
 5000 CONTINUE                                                           ALPHAC  00143
      IF(ISLICE.NE.0) GO TO 5005                                         ALPHAC  00144
      AREA =      (RIGHT-LEFT)                                           ALPHAC  00145
 5005 CONTINUE                                                           ALPHAC  00146
      TA = 0.0                                                           ALPHAC  00147
      IF(ISLICE.EQ.3) GO TO 5020                                         ALPHAC  00148
      IF(L2.LT.BOXTE) GO TO 5100                                         ALPHAC  00149
 5010 IF(R2.LT.BOXTE) GO TO 5102                                         ALPHAC  00150
 5020 CONTINUE                                                           ALPHAC  00151
      IF(ISLICE.EQ.1.OR.ISLICE.EQ.2) GO TO 5400                          ALPHAC  00152
      IF(R1.GT.BOXLE) GO TO 5300                                         ALPHAC  00153
      GO TO 5400                                                         ALPHAC  00154
 5100 ITAG = 1                                                           ALPHAC  00155
      I = 1                                                              ALPHAC  00156
      XC(1) = L2                                                         ALPHAC  00157
      YC(1) = LEFT                                                       ALPHAC  00158
      GO TO 5110                                                         ALPHAC  00159
 5102 ITAG = 2                                                           ALPHAC  00160
      I = 1                                                              ALPHAC  00161
      XC(1) = R2                                                         ALPHAC  00162
      YC(1)=  RIGHT                                                      ALPHAC  00163
 5110 I= I+1                                                             ALPHAC  00164
      IF(NBK2.EQ.0) GO TO 5150                                           ALPHAC  00165
      KIDX = K2 + I - 2                                                  ALPHAC  00166
      IF(I  G.EQ.2) KIDX = K2    +NBK2-1 -I +2                           ALPHAC  00167
      IF(XTED(KIDX).GT.BOXTE) GO TO 5125                                 ALPHAC  00168
      XC(I) = XTED(KIDX)                                                 ALPHAC  00169
      YC(I) = YTED(KIDX)                                                 ALPHAC  00170
      GO TO 5110                                                         ALPHAC  00171
 5125 CONTINUE                                                           ALPHAC  00172
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      IF(ITAG.EQ.2) KIDX=KIDX+1                                    ALPHAC 00173
      XC(I) = BOXTE                                                ALPHAC 00174
      DX = XTED(KIDX) - XTED(KIDX-1)                               ALPHAC 00175
      DY = YTED(KIDX) - YTED(KIDX-1)                               ALPHAC 00176
      IF(ITAG.EQ.2) GO TO 5130                                     ALPHAC 00177
C                                                                  ALPHAC 00178
C         LOWER LEFT CORNER                                        ALPHAC 00179
      DIST = BOXTE -XC(I-1)                                        ALPHAC 00180
      YC(I) = YTED(KIDX-1) + DIST*(DY/DX)                          ALPHAC 00181
      GO TO 5160                                                   ALPHAC 00182
C                                                                  ALPHAC 00183
C         LOWER RIGHT CORNER                                       ALPHAC 00184
 5130 DIST = BOXTE - XC(I-1)                                       ALPHAC 00185
      YC(I) = YC(I-1)+ DIST* (DY/DX)                               ALPHAC 00186
      GO TO 5160                                                   ALPHAC 00187
 5150 CONTINUE                                                     ALPHAC 00188
      XC(I) = BOXTE                                                ALPHAC 00189
      DX = R2 - L2                                                 ALPHAC 00190
      DY = RIGHT - LEFT                                            ALPHAC 00191
      IF(ITAG.EQ.2) GO TO 5155                                     ALPHAC 00192
      DIST = BOXTE -L2                                             ALPHAC 00193
      YC(I) = LEFT + DIST*(DY/DX)                                  ALPHAC 00194
      GO TO 5160                                                   ALPHAC 00195
 5155 DIST = BOXTE -R2                                             ALPHAC 00196
      YC(I) = RIGHT+ DIST*(DY/DX)                                  ALPHAC 00197
 5160 CONTINUE                                                     ALPHAC 00198
      NTRAPS = I-1                                                 ALPHAC 00199
      DO 5175 NX=1,NTRAPS                                          ALPHAC 00200
      A= BOXTE - XC(NX)                                            ALPHAC 00201
      B= BOXTE - XC(NX+1)                                          ALPHAC 00202
      IF(A.GT.1.) A = 1.0                                          ALPHAC 00203
      IF(B.GT.1.) B = 1.0                                          ALPHAC 00204
      H= YC(NX+1) - YC(NX)                                         ALPHAC 00205
      IF(ITAG.EQ.2) H = -H                                         ALPHAC 00206
      TA = TA  + 0.5*(A+B)*H                                       ALPHAC 00207
 5175 CONTINUE                                                     ALPHAC 00208
      IF(ITAG.EQ.2) GO TO 5020                                     ALPHAC 00209
      GO TO 5010                                                   ALPHAC 00210
C                                                                  ALPHAC 00211
C         COMPUTE FOR UPPER RIGHT HAND CORNER                      ALPHAC 00212
 5300 CONTINUE                                                     ALPHAC 00213
      I = 1                                                        ALPHAC 00214
      XC(I) = R1                                                   ALPHAC 00215
      YC(I) = RIGHT                                                ALPHAC 00216
 5310 I = I+1                                                      ALPHAC 00217
      IF(NBK1.EQ.0) GO TO 5350                                     ALPHAC 00218
      KIDX =   K1  + NBK1-1 -I +2                                  ALPHAC 00219
      IF(XLED(KIDX).LT.BOXLE) GO TO 5325                           ALPHAC 00220
      XC(I) = XLED(KIDX)                                           ALPHAC 00221
      YC(I) = YLED(KIDX)                                           ALPHAC 00222
      GO TO 5310                                                   ALPHAC 00223
 5325 CONTINUE                                                     ALPHAC 00224
      XC(I) = BOXLE                                                ALPHAC 00225
      DX = XLED(KIDX+1)-XLED(KIDX)                                 ALPHAC 00226
      DY = YLED(KIDX+1)-YLED(KIDX)                                 ALPHAC 00227
      DIST = BOXLE - XLED(KIDX)                                    ALPHAC 00228
      YC(I)= YLED(KIDX) + DIST*(DY/DX)                             ALPHAC 00229
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      GO TO 5360                                                        ALPHAC  00230
 5350 CONTINUE                                                          ALPHAC  00231
      XC(I) = BOXLE                                                     ALPHAC  00232
      DX = R1 -L1                                                       ALPHAC  00233
      DY = RIGHT - LEFT                                                 ALPHAC  00234
      DIST = BOXLE - L1                                                 ALPHAC  00235
      YC(I)= LEFT + DIST*(DY/DX)                                        ALPHAC  00236
 5360 CONTINUE                                                          ALPHAC  00237
      NTRAPS = I-1                                                      ALPHAC  00238
      DO 5375 NX = 1,NTRAPS                                             ALPHAC  00239
      A = XC(NX) - BOXLE                                                ALPHAC  00240
      B = XC(NX+1)-BOXLE                                                ALPHAC  00241
      IF(A.LT.1..AND.B.LT.1.) GO TO 5370                                ALPHAC  00242
      IF(A.GT.1..AND.B.GT.1.) GO TO 5365                                ALPHAC  00243
C                                                                       ALPHAC  00244
C         A.GT.B1 AND B.LT.B1                                           ALPHAC  00245
      DX = XC(NX) - XC(NX+1)                                            ALPHAC  00246
      DY = YC(NX) - YC(NX+1)                                            ALPHAC  00247
      IF(DY.LT.EPS) GO TO 5375                                          ALPHAC  00248
      DIST = BOXTE - XC(NX+1)                                           ALPHAC  00249
      YINT = YC(NX+1) + DIST*(DY/DX)                                    ALPHAC  00250
      TA = (YC(NX)-YINT)     +TA                                        ALPHAC  00251
      YC(NX) =YINT                                                      ALPHAC  00252
      A = 1.0                                                           ALPHAC  00253
      GO TO 5370                                                        ALPHAC  00254
 5365 CONTINUE                                                          ALPHAC  00255
      TA = TA +     (YC(NX)-YC(NX+1))                                   ALPHAC  00256
      GO TO 5375                                                        ALPHAC  00257
 5370 CONTINUE                                                          ALPHAC  00258
      H = YC(NX) - YC(NX+1)                                             ALPHAC  00259
      TA = TA + 0.5*(A+B)*H                                             ALPHAC  00260
 5375 CONTINUE                                                          ALPHAC  00261
 5400 AREA = AREA -TA                                                   ALPHAC  00262
 4000 CONTINUE                                                          ALPHAC  00263
      RETURN                                                            ALPHAC  00264
      END                                                               ALPHAC  00265
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      SUBROUTINE NTRCEP(J,  YEDG,XEDG,          L1,C1,R1,NBK1,K1,IDEX)  NTRCEP  00002
C                                                                       NTRCEP  00003
C         J      = INDEX OF CHORD NUMBER                                NTRCEP  00004
C         NBK1   = NUMBER OF BREAK POINTS ON EDGE FOR THIS CHORD.       NTRCEP  00005
C         L1     = X COORDINATE OF LEADING EDGE LEFT SIDE INTERSECTION  NTRCEP  00006
C         C1     = X COORDINATE OF LEADING EDGE CENTER LINE INTERSECTION NTRCEP  00007
C         R1     = X COORDINATE OF LEADING EDGE RIGHT SIDE INTERSECTION  NTRCEP  00008
C         K1     = INDEX OF XLEA AND YLEA ARRAYS THAT DEFINE A KINK IF  NTRCEP  00009
C                  ONE EXISTS                                           NTRCEP  00010
      COMMON /LAREA / LEFT,RIGHT,ICODE                                  LAREA   00002
      REAL LEFT,L1,L2                                                   NTRCEP  00012
C         LEFT   = Y COORDINATE OF LEFT SIDE OF CHORD                   NTRCEP  00013
C         RIGHT  = Y COORDINATE OF RIGHT SIDE OF CHORD                  NTRCEP  00014
      DIMENSION  XEDG(1), YEDG(1)                                       NTRCEP  00015
      YJ = J                                                            NTRCEP  00016
      EPS = 1.0E-04                                                     NTRCEP  00017
      K=2                                                               NTRCEP  00018
    1 IF(LEFT.LT.YEDG(K)-EPS) GO TO 2                                   NTRCEP  00019
      K= K+1                                                            NTRCEP  00020
      GO TO 1                                                           NTRCEP  00021
    2 DX = XEDG(K) -XEDG(K-1)                                           NTRCEP  00022
      DY = YEDG(K) - YEDG(K-1)                                          NTRCEP  00023
      DIST = LEFT - YEDG(K-1)                                           NTRCEP  00024
      L1 = XEDG(K-1) + (DX/DY) * DIST                                   NTRCEP  00025
C                                                                       NTRCEP  00026
C         FIND CENI AND BEGIN COUNTING BREAKS                           NTRCEP  00027
      NBK1 = 0                                                          NTRCEP  00028
      K1 = 0                                                            NTRCEP  00029
    3 IF( YJ  .LT.YEDG(K) +EPS) GO TO 4                                 NTRCEP  00030
C                                                                       NTRCEP  00031
C         KINK(S) BETWEEN LEFT AND CENTER LINE                          NTRCEP  00032
      IF(K1.EQ.0) K1 =K                                                 NTRCEP  00033
      NBK1 = NBK1 + 1                                                   NTRCEP  00034
      K = K + 1                                                         NTRCEP  00035
      GO TO 3                                                           NTRCEP  00036
    4 IF(IDEX.EQ.1) GO TO 40                                            NTRCEP  00037
      IF(ABS(YEDG(K)-YJ)  .GT.EPS) GO TO 40                             NTRCEP  00038
      IF(K1.EQ.0) K1 = K                                                NTRCEP  00039
      NBK1 = NBK1 +1                                                    NTRCEP  00040
      IF (YEDG(K+1)-YEDG(K).GT.EPS) GO TO 104                           NTRCE.  00041
      NBK1 = NBK1 + 1                                                   NTRCEP  00042
      K = K + 1                                                         NTRCEP  00043
  104 CONTINUE                                                          NTRCEP  00044
      C1 = XEDG(K)                                                      NTRCEP  00045
      GO TO 5                                                           NTRCEP  00046
   40 DX = XEDG(K) - XEDG(K-1)                                          NTRCEP  00047
      DY = YEDG(K) - YEDG(K-1)                                          NTRCEP  00048
      DIST = YJ   - YEDG(K-1)                                           NTRCEP  00049
      C1 = XEDG(K-1) + (DX/DY) * DIST                                   NTRCEP  00050
C                                                                       NTRCEP  00051
C         FIND R1 IN SAME MANNER AS CENI                                NTRCEP  00052
    5 IF(RIGHT.LT.YEDG(K)+EPS) GO TO 6                                  NTRCEP  00053
C                                                                       NTRCEP  00054
C         KINKS BETWEEN CENTER LINE AND RIGHT SIDE OF CHORD             NTRCEP  00055
      IF(K1.EQ.0) K1 = K                                                NTRCEP  00056
      NBK1 = NBK1 + 1                                                   NTRCEP  00057
      K = K + 1                                                         NTRCEP  00058
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      GO TO 5                                                    NTRCEP  00059
    6 DX = XEDG(K) - XEDG(K-1)                                   NTRCEP  00060
      DY = YEDG(K) - YEDG(K-1)                                   NTRCEP  00061
      DIST = RIGHT - YEDG(K-1)                                   NTRCEP  00062
      R1 = XEDG(K-1) + (DX/DY) * DIST                            NTRCEP  00063
      RETURN                                                     NTRCEP  00064
      END                                                        NTRCEP  00065
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      SUBROUTINE PWAIC(WING,IBOX,LBOX,IWAKE, JCOL)                      PWAIC  00002
C                                                                       PWAIC  00003
C         COMPUTES THE POINTER ARRAY (MUAIC) FOR THE SPATIAL AIC ARRAY  PWAIC  00004
C         OF THE LEFT WING (TAIL) ON ONE CHORD OF THE RIGHT WING (TAIL) PWAIC  00005
C                                                                       PWAIC  00006
C              WING   = WING/TAIL INDICATOR                             PWAIC  00007
C              IBOX   = BOX CODE ARRAY TO USE                           PWAIC  00008
C              IWAKE  = ARRAY OF WAKE EDGE LOCATIONS FOR WING           PWAIC  00009
C              JCOL   = THE (UNSUBDIVIDED) CHORD NUMBER OF INTEREST     PWAIC  00010
C              SURF   = INDICATOR OF WHETHER ANY LEFT SURFACE IS INTER- PWAIC  00011
C                       CEPTED BY THE MACH CONE FOR THIS CORD           PWAIC  00012
C                                                                       PWAIC  00013
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,         GEOMTY 00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,             GEOMTY 00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,        GEOMTY 00004
     3                IXBW,XCENTR                                      GEOMTY 00005
      LOGICAL COPLAN                                                    GEOMTY 00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,MXBT,MYBT,MYBBT,MXBST,MYBST,      GEOM2  00002
     1                MYBBST,IXBT,IXBST,CAPL                           GEOM2  00003
      COMMON /MUAICS/ YBAR,EL,MUAIC(2,50),NROWS,SURF,                   MUAICS 00002
     1                YBARL,ELL, MUAICL(2,50),NROWSL,SURFL,PSIDIF      MUAICS 00003
      LOGICAL SURF,SURFL                                                MUAICS 00004
      COMMON /EDGES / TEXLOC(250), TEXLOC(250),JDIAG                    EDGES  00002
C                                                                       PWAIC  00018
      LOGICAL WING                                                      PWAIC  00019
      DIMENSION IBOX(LBOX,8), ICODE(50), IWAKE(1)                       PWAIC  00020
      DATA  EPS / 1.0E-4 /                                              PWAIC  0002'
C                                                                       PWAIC  00022
      IF (WING) GO TO 100                                               PWAIC  00023
C                                                                       PWAIC  00024
C         THE CALL IS FOR A TAIL CHORD                                  PWAIC  00025
      PSI2 = PSIT + PSIT                                                PWAIC  00026
      IXB = (IXBT-IXBW)/NSUBDV + 1                                      PWAIC  00027
      MXB = MXBT                                                        PWAIC  00028
      IF (JCOL .LE. MYBT) GO TO 120                                     PWAIC  00029
C         THE CHORD IS ON THE TIP DIAPHRAGM                             PWAIC  00030
      IFRST = IXB                                                       PWAIC  00031
      NU = MXBT-IFRST+1                                                 PWAIC  00032
      GO TO 130                                                         PWAIC  00033
C                                                                       PWAIC  00034
C         THE CALL IS FOR A WING CHORD                                  PWAIC  00035
  100 CONTINUE                                                          PWAIC  00036
      PSI2 = PSIW + PSIW                                                PWAIC  00037
      IXB = 1                                                           PWAIC  00038
      IF (COPLAN) GO TO 110                                             PWAIC  00039
      MXB = MXBBW                                                       PWAIC  00040
      IF (JCOL .GT. MYBW) GO TO 115                                     PWAIC  00041
      ISUB = JCOL+NSUBDV - NSUBD2                                       PWAIC  00042
      GO TO 125                                                         PWAIC  00043
C                                                                       PWAIC  00044
C         THE CALL IS FOR A COPLANAR WING-TAIL                          PWAIC  00045
  110 CONTINUE                                                          PWAIC  00046
      MXB = MXBT                                                        PWAIC  00047
      IF (JCOL .LE. MYBT) GO TO 120                                     PWAIC  00048
C         THE CHORD IS ON THE TIP DIAPHRAGM                             PWAIC  00049
  115 CONTINUE                                                          PWAIC  00050
      IFRST = 1                                                         PWAIC  00051
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      NJ = MXB                                                          PWAIC 00052
      GO TO 130                                                         PWAIC 00053
C                                                                       PWAIC 00054
C         THE CHORD IS ON PLANFORM                                      PWAIC 00055
  120 CONTINUE                                                          PWAIC 00056
      ISUB = MYBSW + JCOL*NSUBDV - NSUBD2                               PWAIC 00057
  125 CONTINUE                                                          PWAIC 00058
      IFRST = (TEXLOC(ISUB)-IXBW) / NSUBDV + 1                          PWAIC 00059
      NJ = MXB - IFRST + 1                                              PWAIC 00060
C                                                                       PWAIC 00061
  130 CONTINUE                                                          PWAIC 00062
      CALL DCODER(IBOK,LBOK, IFRST,JCOL, MXB,JCOL, .F., ICODE)          PWAIC 00063
      IROW = IFRST                                                      PWAIC 00064
      DO 135 I = 1,NJ                                                   PWAIC 00065
      IA = I                                                            PWAIC 00066
      IF (ICODE(I) .NE. 0) GO TO 140                                    PWAIC 00067
      IROW = IROW + 1                                                   PWAIC 00068
  135 CONTINUE                                                          PWAIC 00069
  140 CONTINUE                                                          PWAIC 00070
      IF (IA .GE. NJ) GO TO 155                                         PWAIC 00071
      DO 145 I = IA,NJ                                                  PWAIC 00072
      IF (ICODE(I) .EQ. 0) GO TO 150                                    PWAIC 00073
      IROW = IROW + 1                                                   PWAIC 00074
  145 CONTINUE                                                          PWAIC 00075
  150 CONTINUE                                                          PWAIC 00076
      IROW = IROW - 1                                                   PWAIC 00077
  155 CONTINUE                                                          PWAIC 00078
      NROWS = IROW - IXB + 1                                            PWAIC 00079
C                                                                       PWAIC 00080
C         COMPUTE HORIZONTAL AND VERTICAL OFFSETS                       PWAIC 00081
      YMUSND = (JCOL-.5)*COS(PSI2)                                      PWAIC 00082
C             = Y-OFFSET ON THE SENDING SURFACE OF THE PROJECTION OF THE PWAIC 00083
C               RECEIVING CHORD                                         PWAIC 00084
      JBAR   = IFIX(YMUSND) + 1                                         PWAIC 00085
C             = CHORD CONTAINING YMUSND                                 PWAIC 00086
      YBAR   = YMUSND - JBAR + .5                                       PWAIC 00087
C             = DISTANCE FROM NEAREST SENDING CHORD CENTER TO PROJEC-   PWAIC 00088
C               TION OF THE RECEIVING CHORD, POSITIVE RIGHT.            PWAIC 00089
      EL     = (JCOL - .5) * SIN(PSI2)                                  PWAIC 00090
C             = VERTICAL SEPARATION BETWEEN THE SENDING PLANE AND THE   PWAIC 00091
C               RECEIVING CHORD                                         PWAIC 00092
      IF (YBAR) 160,165,170                                             PWAIC 00093
  160 JMIN = JBAR - 1                                                   PWAIC 00094
      NBOXES = 2                                                        PWAIC 00095
      GO TO 180                                                         PWAIC 00096
  165 JMIN = JBAR                                                       PWAIC 00097
      NBOXES = 1                                                        PWAIC 00098
      GO TO 180                                                         PWAIC 00099
  170 JMIN = JBAR                                                       PWAIC 00100
      NBOXES = 2                                                        PWAIC 00101
C                                                                       PWAIC 00102
  180 CONTINUE                                                          PWAIC 00103
      JL = 1                                                            PWAIC 00104
      SURF = .F.                                                        PWAIC 00105
C                                                                       PWAIC 00106
C         START OF LOOP ON ROWS, FORWARD FROM RECEIVING BOX CENTER, TO  PWAIC 00107
C         DEFINE THE MUAIC ARRAY                                        PWAIC 00108
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      DO 280 I = 1,NROWS                                                PWAAIC  00109
      XI = I - .5 - ABS(EL)                                             PWAAIC  00110
      IF (XI .LE. EPS) GO TO 260                                        PWAAIC  00111
      IF (JMIN .GT. 0) GO TO 260                                        PWAAIC  00112
C         CENTER LINE HAS BEEN CROSSED, THEREFORE THERE MAY BE CONTRIBU- PWAAIC  00113
C         TION FROM THE LEFT WING FOR THIS ROW                          PWAAIC  00114
      JM = -JMIN + 1                                                    PWAAIC  00115
      JMM = JM-JL+1                                                     PWAAIC  00116
      CALL DCODER(IBOX,LBOX, IROW,1, IROW,JMM, .F., ICODE)              PWAAIC  00117
      DO 240 J = JL,JM                                                  PWAAIC  00118
      IF (ICODE(JMM) .NE. 0) GO TO 250                                  PWAAIC  00119
      JMM = JMM-1                                                       PWAAIC  00120
  240 CONTINUE                                                          PWAAIC  00121
      NROWS = I - 1                                                     PWAAIC  00122
      GO TO 290                                                         PWAAIC  00123
C         CONTRIBUTING BOXES HAVE BEEN FOUND FOR THIS ROW               PWAAIC  00124
  250 CONTINUE                                                          PWAAIC  00125
      SURF = .T.                                                        PWAAIC  00126
      JL = J                                                            PWAAIC  00127
      IF (YBAR .GE. 0) GO TO 255                                        PWAAIC  00128
      MWAIC(1,I) = NBOXES - JM + 1                                      PWAAIC  00129
      MWAIC(2,I) = NBOXES - JL + 1                                      PWAAIC  00130
      GO TO 270                                                         PWAAIC  00131
  255 CONTINUE                                                          PWAAIC  00132
      MWAIC(1,I) = JL                                                   PWAAIC  00133
      MWAIC(2,I) = JM                                                   PWAAIC  00134
      GO TO 270                                                         PWAAIC  00135
C                                                                       PWAAIC  00136
C         CENTER LINE HAS NOT BEEN CROSSED                              PWAAIC  00137
  260 MWAIC(1,I) = 0                                                    PWAAIC  00138
      MWAIC(2,I) = 0                                                    PWAAIC  00139
C                                                                       PWAAIC  00140
  270 CONTINUE                                                          PWAAIC  00141
      NBOXES = NBOXES + 2                                               PWAAIC  00142
      JMIN = JMIN - 1                                                   PWAAIC  00143
      IROW = IROW - 1                                                   PWAAIC  00144
  280 CONTINUE                                                          PWAAIC  00145
C         END OF LOOP FORWARD ON ROWS, FROM 180*                        PWAAIC  00146
C                                                                       PWAAIC  00147
  290 CONTINUE                                                          PWAAIC  00148
      RETURN                                                            PWAAIC  00149
      END                                                               PWAAIC  00150
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      OVERLAY(AFMBOX,1,3)                                                MODES   00002
      PROGRAM MODES                                                      MODES   00003
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,     PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                               PROBLM  00003
      LOGICAL         SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                  PROBLM  00004
      COMMON /CONTRL/ PREVEX,CMACH, TITLE(8), PRVGEOM,PRVMODE,DIHW,DIHT, CONTRL  00002
     1               DEFAULT                                            CONTRL  00003
      LOGICAL     PRVGEOM,PRVMODE,DIHW,DIHT,DEFAULT                      CONTRL  00004
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,          GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,               GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,          GEOMTY  00004
     3                IXBW,XCENTR                                        GEOMTY  00005
      LOGICAL COPLAN                                                     GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,MXBT,MYBT,MYBBT,MXBST,MYBST,       GEOM2   00002
     1                MYBBST,IXBT,IXBST,CAPL                             GEOM2   00003
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,          FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC           FILES   00003
      EQUIVALENCE (IWTFSC,ITSLSC)                                        MODES   00009
      COMMON /IOCONT/ OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,       IOCONT  00002
     1                PRPAIC,PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,        IOCONT  00003
     2                PRBL,PRDCP,PRGNAF,PRGNAC,PRSL,PRLW,PRNW,PRCM       BCSFRB  00001
      EQUIVALENCE (PRUW,PRDW)                                            IOCONT  00005
      LOGICAL    OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,PRPAIC,     IOCONT  00006
     1           PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,PRBL,PRSL,PRGNAF,   IOCONT  00007
     2           PRDCP,PRGNAC,PRUW,PRLW,PRNW,PRCM                        BCSFRB  00002
      COMMON /TAPEIO/ NFS,NMS,LS,NMR,ID(20),NID,ITYPE,LRS,LWS,M,N,       TAPEIO  00002
     1                PARM(10),IRR                                       TAPEIO  00003
      DIMENSION IPARM(10)                                                TAPEIO  00004
      EQUIVALENCE (PARM,IPARM)                                           TAPEIO  00005
      COMMON /ARRAYS/ KBXCDW,LBXCDW,LBCXC,KBXCDT,LDXCDT,KJALPH,LJALPH,   ARRAYS  00002
     1                KALPHA,KKERNL,LKERNL,KPNTRM,LPNTRM,KDEFSL,KELPHI,  ARRAYS  00003
     2                LMODES,KPNTSD,LPNTSD,KSDW,LSDW,KPNTDW,LPNTDW,      ARRAYS  00004
     3                KDW,LDW,KTVP,LTVP                                  ARRAYS  00005
      COMMON / MODES/ SYM,SYMT,MTYPEW,MTYPET                             MODCOM  00002
      COMMON /CHECKPR/ DPPCPR,GEOCPR,MODCPR,AICCPR,NWSCPR,SMCPR,GAFCPR   CHECKPR 00002
      LOGICAL  DPPCPR, GEOCPR, MODCPR, AICCPR,NWSCPR,  SMCPR, GAFCPR     CHECKPR 00003
      EQUIVALENCE (CHECKPR,MODCPR)                                       MODES   00015
      LOGICAL CHECKPR                                                    MODES   00016
C               DEFSL(2,NBOXES), XX(NPTS), YY,ZZ SAME,    A(NO OF COEF)  MODES   00017
      DIMENSION DEFSL(2,1000),   XX(100),YY(100),ZZ(100), A(21)          MODES   00018
      COMMON /INDEX/ IS(100),NOC(100),JS(100),JOC(100)                   MODES   00019
      DIMENSION  IPNTRM(2,100)                                           MODES   00020
      DIMENSION XP(6),YP(6),X1(100),Y1(100)                              MODES   00021
      DIMENSION DOS(50)                                                  MODES   00022
      DIMENSION  FEXLOC(250),           TEXLOC(250)                      MODES   00023
C               FEXLOC(MYBSW+MYBST),    TEXLOC SAME )                    MODES   00024
C                                                                        MODES   00026
      LOGICAL MXREAD,RANDIN,MXWRIT,RANDOU                                MODES   00027
      NAMELIST /CARDM / NMODES, NTSLOP                                   FTNX1   00043
      MXREAD = .FALSE.                                                   MODES   00028
      MXWRIT = .FALSE.                                                   MODES   00029
      RANDIN = .FALSE.                                                   MODES   00030
      RANDOU = .FALSE.                                                   MODES   00031
      EPS = 1.0E-04                                                      MODES   00032
      GAMMA = 1.4                                                        MODES   00033
      GAMC = XMACH*(GAMMA+1.0)/2.                                        MODES   00034
      IF(.NOT.PRVMODE) GO TO 100                                         MODES   00035
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      IF(.NOT.PRVGEOM) GO TO 50                                          MODES  00036
      WRITE (NT6,7005)                                                   MODES  00037
      RETURN                                                             MODES  00038
C                                                                        MODES  00039
   50 CONTINUE                                                           MODES  00040
      IF(MTYPEW.EQ.3) GO TO 75                                           MODES  00041
      IF(NSURF.EQ.2.AND.MTYPET.EQ.3) GO TO 75                            MODES  00042
      WRITE (NT6,7010)                                                   MODES  00043
      GO TO 125                                                          MODES  00044
C                                                                        MODES  00045
   75 CONTINUE                                                           MODES  00046
      WRITE (NT6,7015)                                                   MODES  00047
      CALL FLUSH(1)                                                      MODES  00048
C                                                                        MODES  00049
  100 CONTINUE                                                           MODES  00050
C                                                                        MODES  00051
C                                                                        MODES  00052
      NMODES = 0                                                         MODES  00053
      MTSLOP = 0                                                         MODES  00054
      READ(NT5,CARDM)                                                    MODES  00055
  125 CONTINUE                                                           MODES  00056
      REWIND IGEOSC                                                      MODES  00057
C                                                                        MODES  00058
C         READ FEXLOC AND TEXLOC ARRAY FROM GEOMETRY SCRATCH FILE        MODES  00059
      MNAME =6HFEXLOC                                                    MODES  00060
      CALL RDINIT                                                        MODES  00061
      ITYPE = 5HMIXED                                                    MODES  00062
      NMS = 1                                                            MODES  00063
      IF(.NOT.COPLAN.AND.NSURF.EQ.2) NMS = 2                             MODES  00064
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,    MODES  00065
     1            LRS,FEXLOC, M,N,PARM,IRR)                              MODES  00066
      IF(IRR.NE.0) GO TO 6010                                            MODES  00067
C                                                                        MODES  00068
      MNAME =6HTEXLOC                                                    MODES  00069
      CALL RDINIT                                                        MODES  00070
      ITYPE = 5HMIXED                                                    MODES  00071
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,    MODES  00072
     1            LRS,TEXLOC,M,N,PARM,IRR)                               MODES  00073
      IF(IRR.NE.0) GO TO 6010                                            MODES  00074
C                                                                        MODES  00075
C                                                                        MODES  00076
C         ZERO OUT THE ROW AND COL POINTERS                              MODES  00077
      DO 150 I = 1,400                                                   MODES  00078
      IS(I) = 0                                                          MODES  00079
  150 CONTINUE                                                           MODES  00080
C                                                                        MODES  00081
C                                                                        MODES  00082
C         DETERMINE STARTING BOXES AND NUMBER OF BOXES PER CHORD.        MODES  00083
      IYB1 = (NSUBDV+1)/2                                                MODES  00084
      DO 300 NS=1,NSURF                                                  MODES  00085
      IF(NS.EQ.2) GO TO 200                                              MODES  00086
      NC =1                                                              MODES  00087
      NCH = MYBW                                                         MODES  00088
      NCF= 0                                                             MODES  00089
      ICN = IXBW - IYB1                                                  MODES  00090
      IXB = IXBW                                                         MODES  00091
      GO TO 225                                                          MODES  00092
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  200 CONTINUE                                                          MODES   00093
      NC = MYBW + 1                                                     MODES   00094
      NCH = MYBW + MYBT                                                 MODES   00095
      NCF = MYBW * NSUBDV                                               MODES   00096
      IFBT = (IXBT-IXBW)/NSUBDV + 1                                     MODES   00097
  225 CONTINUE                                                          MODES   00098
      IYB = IYB1 + NCF                                                  MODES   00099
      DO 250 J=NC,NCH                                                   MODES   00100
      IS(J) = FEXLOC(IYB) + 1.0                                         MODES   00101
      ITEI  = TEXLOC(IYB)                                               MODES   00102
      IF(NSUBDV.EQ.1) GO TO 240                                         MODES   00103
      IS(J) = (IS(J)-ICN)/NSUBDV + 1                                    MODES   00104
      ITEI  = (ITEI-IXB)/NSUBDV  + 1                                    MODES   00105
  240 CONTINUE                                                          MODES   00106
      NOC(J) = ITEI-IS(J) + 1                                           MODES   00107
      IYB =  IYB + NSUBDV                                               MODES   00108
  250 CONTINUE                                                          MODES   00109
  300 CONTINUE                                                          MODES   00110
      CALL ROPER                                                        MODES   00111
C                                                                       MODES   00112
C                                                                       MODES   00113
C         FIND OVERLAP OF 2 PLANFORMS IF THEY ARE NON-COPLANAR          MODES   00114
      IOVLAP = 0                                                        MODES   00115
      NPNTRS = MXBW+1                                                   MODES   00116
      IF(NSURF.EQ.1) GO TO 325                                          MODES   00117
      IF(COPLAN) GO TO 324                                              MODES   00118
      IF(IFBT.GT.MXBW) GO TO 324                                        MODES   00119
      IOVLAP = MXBW - IFBT + 1                                          MODES   00120
      NPNTRS = MXBT + IOVLAP + 1                                        MODES   00121
      GO TO 325                                                         MODES   00122
  324 CONTINUE                                                          MODES   00123
      NPNTRS = MXBT + 1                                                 MODES   00124
  325 CONTINUE                                                          MODES   00125
C         COMPUTE POINTER ARRAY AND STORE ON MODESC                     MODES   00126
      REWIND MODESC                                                     MODES   00127
C                                                                       MODES   00128
      IPNTRM(1,1) = 1                                                   MODES   00129
      IPNTRM(2,1) = JS(1)                                               MODES   00130
      DO 320 I=2,NPNTRS                                                 MODES   00131
      IPNTRM(1,I) = IPNTRM(1,I-1) + JOC(I-1)                            MODES   00132
      IPNTRM(2,I) = JS(I)                                               MODES   00133
  320 CONTINUE                                                          MODES   00134
      CALL RDINIT                                                       MODES   001..
      IPARM(3) = IOVLAP                                                 MODES   00136
      ITYPE = 5HMIXED                                                   MODES   00137
      CALL WRTEMX(MODESC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,2,ID,         MODES   00138
     1            IPNTRM,ITYPE,2,NPNTRS,PARM,IRR)                       MODES   00139
      IF(IRR.NE.0) GO TO 6030                                           MODES   00140
C         FIRST LOOP DETERMINES MODE SHAPES.                            MODES   00141
C         SECOND LOOP DETERMINES THICKNESS SLOPES.                      MODES   00142
C                                                                       MODES   00143
      DO 2000 IPASS=1,2                                                 MODES   00144
      IF(IPASS.EQ.2) GO TO 2100                                         MODES   00145
C         LOOP ON NUMBER OF SURFACES                                    MODES   00146
      DO 2000 NS=1,NSURF                                                MODES   00147
      IF(NS.EQ.NSURF) GO TO 330                                         MODES   00148
C                                                                       MODES   00149
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      IFILE = IVPSC                                                    MODES   00150
      REWIND IVPSC                                                     MODES   00151
      GO TO 340                                                        MODES   00152
  330 CONTINUE                                                         MODES   00153
      IFILE = MODESC                                                   MODES   00154
  340 CONTINUE                                                         MODES   00155
C                                                                      MODES   00156
C         LOOP ON NUMBER OF MODES                                      MODES   00157
      DO 1500 NM =1,NMODES                                             MODES   00158
C                                                                      MODES   00159
C                                                                      MODES   00160
C        ZERO OUT THE DEFSL ARRAY                                      MODES   00161
      DO 350 I = 1,LMODES                                              BCSMDA  00002
      DEFSL(1,I) = 0.0                                                 MODES   00163
      DEFSL(2,I) = 0.0                                                 MODES   00164
  350 CONTINUE                                                         MODES   00165
C                                                                      BCSMDA  00003
C         ZERO OUT THE COEFFICIENT ARRAY                               BCSMDA  00004
      DO 355 I = 1,21                                                  BCSMDA  00005
      A(I) = 0.0                                                       BCSMDA  00006
  355 CONTINUE                                                         BCSMDA  00007
C                                                                      MODES   00166
C         INPUT FIRST PLANFORM IF THERE IS A TAIL SECTION               MODES   00167
      IF(NS.EQ.1) GO TO 400                                            MODES   00168
      READ (IVPSC) DEFSL                                               MODES   00169
C                                                                      MODES   00170
C                                                                      MODES   00171
  400 CONTINUE                                                         MODES   00172
      IF(.NOT.PRVMODE) GO TO 450                                       MODES   00173
      CALL RDINIT                                                      MODES   00174
      IF(NS.EQ.1.AND.NM.EQ.1) NFS = 2                                  MODES   00175
      MNAME = 6H COEF.                                                 MODES   00176
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,  MODES   00177
     1            LRS,A,M,N,PARM,IER)                                  MODES   00178
      IF(IER.NE.0) GO TO 6010                                          MODES   00179
      NFS = 0                                                          MODES   00180
C                                                                      MODES   00181
      GO TO 551                                                        MODES   00182
  450 CONTINUE                                                         MODES   00183
      ITYPE = MTYPEW                                                   MODES   00184
      IF(NS.EQ.2) ITYPE = MTYPET                                       MODES   00185
      GO TO (501,502,503),ITYPE                                        MODES   00186
C                                                                      MODES   00187
C         READ IN POLYNOMIAL COEFFICIENTS                              MODES   00188
  501 CONTINUE                                                         MODES   00189
      READ(NT5,8010) IDEG                                              MODES   00190
      IF (IDEG .LT. 0 .OR. IDEG .GT. 5) GO TO 6000                     MODES   00191
 8010 FORMAT(2I5)                                                      MODES   00192
      MDEG = IDEG + 1                                                  MODES   00193
      DEG = MDEG                                                       MODES   00194
      DEG2= DEG/2.                                                     MODES   00195
      NC  = DEG+DEG2 + DEG2 + EPS                                      MODES   00196
      READ(NT5,8015)(A(I),I=1,NC)                                      MODES   00197
 8015 FORMAT(7E10.0)                                                   MODES   00198
      IFLAG = 1                                                        MODES   00199
      GO TO 530                                                        MODES   00200
C                                                                      MODES   00201
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C         READ IN DEFLECTIONS AT SELECTED LOCATIONS AND FIT A POLYNOMIAL MODES   00202
C         OF DEGREE IDEG TO THE POINTS USING METHOD OF LEAST SQUARES.    MODES   00203
  302 CONTINUE                                                           MODES   00204
      READ (NT5,8010) IDEG,NPTS                                          MODES   00205
      IF (IDEG .LT. 0 .OR. IDEG .GT. 5) GO TO 6005                       MODES   00206
      IF (NPTS .GT. 100 .OR. NPTS .LT. 1) GO TO 6005                     MODES   00207
      READ (NT5,8020) (XX(I),YY(I),ZZ(I),I=1,NPTS)                       MODES   00208
 8020 FORMAT(6E10.0)                                                     MODES   00209
      IDIM = 1                                                           MODES   00210
      CN = 1.0                                                           MODES   00211
C                                                                        MODES   00212
C         CN IS A SCALE FACTOR TO REDUCE THE MAGNITUDE OF THE NUMBERS    MODES   00213
C         IDIM IS A DIMENSION VARIABLE SET TO 1 TO INDICATE FIT IS       MODES   00214
C         BEING MADE ON REAL VALUES . IDIM = 2 FOR COMPLEX Z VALUES.     MODES   00215
      CALL FITTER(IDEG,NPTS,XX,YY,ZZ,A,CN,IDIM)                          MODES   00216
C                                                                        MODES   00217
      IFLAG = 2                                                          MODES   00218
      MDEG = IDEG + 1                                                    MODES   00219
      DEG = IDEG + 1                                                     MODES   00220
      DEG2 = DEG/2.                                                      MODES   00221
      NC = DEG*DEG2 + DEG2 + EPS                                         MODES   00222
C                                                                        MODES   00223
C                                                                        MODES   00224
  550 CONTINUE                                                           MODES   00225
C                                                                        MODES   00226
C         STORE THE COEFFICIENTS ON THE THIRD FILE OF THE IGEOSC FILE.   MODES   00227
C         IF THE COEFFICIENTS ARE TO BE PRINTED THE ONES FOR THE FIRST   MODES   00228
C         SURFACE MUST BE STORED ON A SCRATCH FILE TEMPORARILY.          MODES   00229
C                                                                        MODES   00230
      CALL RDINIT                                                        MODES   00231
      IF(NS.EQ.1.AND.NM.EQ.1) NFS = 2                                    MODES   00232
      IPARM(3) = IDEG                                                    MODES   00233
      IPARM(4) = IFLAG                                                   MODES   00234
      ITYPE = 5HMIXED                                                    MODES   00235
      CALL WRTEMX(IGEOSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,1,ID,          MODES   00236
     1            A,ITYPE,1,NC,PARM,IRR)                                 MODES   00237
      IF(IRR.NE.0) GO TO 6050                                            MODES   00238
      NFS = 0                                                            MODES   00239
C                                                                        MODES   00240
      IF(.NOT.PRCOEF) GO TO 3550                                         MODES   00241
      IF(NS.EQ.2.OR.NSURF.EQ.1) GO TO 3550                               MODES   00242
      IF(NM.EQ.1) REWIND IAICSC                                          MODES   00243
C                                                                        MODES   00244
      CALL WRTEMX(IAICSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,1,ID,          MODES   00245
     1            A,ITYPE,1,NC,PARM,IRR)                                 MODES   00246
      IF(IRR.NE.0) GO TO 6060                                            MODES   00247
C                                                                        MODES   00248
 3550 CONTINUE                                                           MODES   00249
      IF(NS.EQ.2.AND.NM.EQ.1) REWIND IAICSC                              MODES   00250
C                                                                        MODES   00251
C         EVALUATE THE POLYNOMIAL EQUATION FOR DEFLECTIONS.              MODES   00252
C           E PARTIAL DERIVATIVE WITH RESPECT TO X TO GET SLOPES.        MODES   00253
C                                                                        MODES   00254
C                                                                        MODES   00255
  551 CONTINUE                                                           MODES   00256
      IF(NM.NE.1) GO TO 560                                              MODES   00257
      IF(NS.EQ.2) GO TO 556                                              MODES   00258
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C                                                                       MODES  00259
C       CALCULATE X,Y COORDINATES FOR EVALUATION OF POLYNOMIAL          MODES  00260
      X1(1) = XCENTR                                                    MODES  00261
      Y1(1) = 0.5*B1BETA                                                MODES  00262
      IF(NSURF.EQ.2) GO TO 552                                          MODES  00263
      MMAX = MAXO(MXBW,MYBW)                                            MODES  00264
      GO TO 554                                                         MODES  00265
  552 CONTINUE                                                          MODES  00266
      MMAX = MAXO(MXBT,MYBT,MYBW)                                       MODES  00267
  554 CONTINUE                                                          MODES  00268
      DO 555 I= 2,MMAX                                                  MODES  00269
      X1(I) = X1(I-1)+B1                                                MODES  00270
      Y1(I) = Y1(I-1)+B1BETA                                            MODES  00271
  555 CONTINUE                                                          MODES  00272
      GO TO 560                                                         MODES  00273
C                                                                       MODES  00274
  556 CONTINUE                                                          MODES  00275
      XADJ = TLAX - WLAX                                                MODES  00276
      DO 557 I=1,MMAX                                                   MODES  00277
      X1(I) = X1(I) - XADJ                                              MODES  00278
  557 CONTINUE                                                          MODES  00279
      GO TO 580                                                         MODES  00280
C                                                                       MODES  00281
C                                                                       MODES  00282
  580 CONTINUE                                                          MODES  00283
      IF(NS.EQ.2) GO TO 980                                             MODES  00284
      IC = 0                                                            MODES  00285
      ILIM = MXBW                                                       MODES  00286
      IBEG = 1                                                          MODES  00287
      NCH = 0                                                           MODES  00288
      GO TO 564                                                         MODES  00289
  980 CONTINUE                                                          MODES  00290
      IBEG = IFBT                                                       MODES  00291
      ILIM = MXBT                                                       MODES  00292
      NCH  = MYBW                                                       MODES  00293
      IC = 0                                                            MODES  00294
      IUP = MXBW                                                        MODES  00295
      IF(COPLAN) IUP = IFBT-1                                           MODES  00296
      DO 563 I=1,IUP                                                    MODES  00297
      IC = IC + JOC(I)                                                  MODES  00298
  563 CONTINUE                                                          MODES  00299
  564 CONTINUE                                                          MODES  00300
      DO 575 IX=IBEG,ILIM                                               MODES  00301
      I = IX                                                            MODES  00302
      IF(NS.EQ.2) I = IX + ICAMLAP                                      MODES  00303
      XP(1) =1.                                                         MODES  00304
      DO 561 IP=2,MDEG                                                  MODES  00305
  561 XP(IP) = XP(IP-1) * X1(IX)                                        MODES  00306
      JI= JS(I)                                                         MODES  00307
      JT= JOC(I)+ JI -1                                                 MODES  00308
      DO 570 J=JI,JT                                                    MODES  00309
      IC = IC +1                                                        MODES  00310
      IB = IS(J+NCH)                                                    MODES  00311
      IT = IB +  NOC(J+NCH) -1                                          MODES  00312
      IF(IX.LT.IB) GO TO 570                                            MODES  00313
      IF(IX.GT.IT) GO TO 570                                            MODES  00314
      YP(1) =1.                                                         MODES  00315
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      DO 562 JP =2,MDEG                                                 MODES   00316
  562 YP(JP) = YP(JP-1)*Y1(J)                                           MODES   00317
      D = A(1)                                                          MODES   00318
      S = 0.0                                                           MODES   00319
      IF (MDEG .LT. 2) GO TO 567                                        BCSMDA  00008
      IA =  1                                                           MODES   00320
      DO 565 L2=2,MDEG                                                  MODES   00321
      DO 565 L3=1,L2                                                    MODES   00322
      L4 = L2-L3+1                                                      MODES   00323
      IA = IA + 1                                                       MODES   00324
      D = D + XP(L4)*YP(L3)*A(IA)                                       MODES   00325
      IF(L4.EQ.1) GO TO 565                                             MODES   00326
      L5 = L4 - 1                                                       MODES   00327
      S = S + L5*XP(L5)*YP(L3)*A(IA)                                    MODES   00328
  565 CONTINUE                                                          MODES   00329
  567 CONTINUE                                                          BCSMDA  00009
      DEFSL(1,IC) = D                                                   MODES   00330
      DEFSL(2,IC) = S                                                   MODES   00331
  570 CONTINUE                                                          MODES   00332
  575 CONTINUE                                                          MODES   00333
      GO TO  900                                                        MODES   00334
C                                                                       MODES   00335
C         READ IN DEFLECTIONS AND SLOPES AT BOX CENTERS                 MODES   00336
  503 CONTINUE                                                          MODES   00337
      IF(INTAPE.EQ.0.OR.INTAPE.EQ.5) GO TO 700                          MODES   00338
C                                                                       MODES   00339
C         MODES ON TAPE. CALL SPECIAL ROUTINE TO HANDLE.                MODES   00340
      CALL TAPMOD(NS,NM,DEFSL)                                          MODES   00341
      GO TO 900                                                         MODES   00342
  700 CONTINUE                                                          MODES   00343
      IF(NS.EQ.2) GO TO 720                                             MODES   00344
C                                                                       MODES   00345
C         FIRST PLANFORM                                                MODES   00346
      NCH = MYBW                                                        MODES   00347
      NC  = 1                                                           MODES   00348
      GO TO 725                                                         MODES   00349
  720 CONTINUE                                                          MODES   00350
      NC = MYBW + 1                                                     MODES   00351
      NCH = MYBW + MYBT                                                 MODES   00352
C                                                                       MODES   00353
C         READ AND STORE DEFLECTIONS                                    MODES   00354
  725 CONTINUE                                                          MODES   00355
      DO 750 J=NC,NCH                                                   MODES   00356
      IST = IS(J)                                                       MODES   00357
      NK = NOC(J) + IST - 1                                             MODES   00358
      JSUM = 0                                                          MODES   00359
      ITROW = IST                                                       MODES   00360
      IF(.NOT.COPLAN.AND.NS.EQ.2) ITROW = IST + IOVLAP                  MODES   00361
      DO 730 I=1,ITROW                                                  MODES   00362
  730 JSUM = JSUM + JOC(I)                                              MODES   00363
      JSUB = JSUM - JOC(ITROW) + 1                                      MODES   00364
      READ (NT5,9015) (DOG(I),I=IS),NK)                                 MODES   00365
      DO 750 I=IST,NK                                                   MODES   00366
      IX = I                                                            MODES   00367
      IF(.NOT.COPLAN.AND.NS.EQ.2) IX = I + IOVLAP                       MODES   00368
      ISUB = JSUM + J - JS(IX) - NC + 1                                 MODES   00369
      DEFSL(1,ISUB) =DOG(I)                                             MODES   00370
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      JSUM = JSUM + JOC(IX)                                              MODES   00371
  750 CONTINUE                                                           MODES   00372
C                                                                        MODES   00373
C         READ AND STORE SLOPES                                          MODES   00374
      DO 775 J=NC,NCH                                                    MODES   00375
      IST = IS(J)                                                        MODES   00376
      NK = NOC(J) +IST -1                                                MODES   00377
      JSUM = 0                                                           MODES   00378
      ITROW = IST                                                        MODES   00379
      IF(.NOT.COPLAN.AND.NS.EQ.2) ITROW = IST + IOVLAP                   MODES   00380
      DO 770 I=1,ITROW                                                   MODES   00381
  770 JSUM = JSUM + JOC(I)                                               MODES   00382
      JSUM = JSUM - JOC(ITROW) + 1                                       MODES   00383
      READ(NT5,9015) (DOS(I),I=IST,NK)                                   MODES   00384
      DO 775 I=IST,NK                                                    MODES   00385
      IX =I                                                              MODES   00386
      IF(.NOT.COPLAN.AND.NS.EQ.2) IX = I + IOVLAP                        MODES   00387
      ISUB = JSUM + J - JS(IX) - NC + 1                                  MODES   00388
      DEFSL(2,ISUB) = DOS(I)                                             MODES   00389
      JSUM = JSUM + JOC(IX)                                              MODES   00390
  775 CONTINUE                                                           MODES   00391
  900 CONTINUE                                                           MODES   00392
C                                                                        MODES   00393
C         WRITE THE DEFSL ARRAY ONTO MODESC FILE                         MODES   00394
      IF(NS.EQ.NSURF) GO TO 925                                          MODES   00395
      WRITE (IFILE) DEFSL                                                MODES   00396
      GO TO 950                                                          MODES   00397
  925 CONTINUE                                                           MODES   00398
      CALL RDINIT                                                        MODES   00399
      ITYPE = 5HMIXED                                                    MODES   00400
      N = IPNTRM(1,NPNTRS)-1                                             MODES   00401
      CALL WRTEMX(IFILE,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,2,ID,           MODES   00402
     1            DEFSL,ITYPE,2,N,PARM,IRR)                              MODES   00403
      IF(IRR.NE.0) GO TO 6020                                            MODES   00404
  950 CONTINUE                                                           MODES   00405
      IF(NS.NE.NSURF) GO TO 1500                                         MODES   00406
      IF(.NOT.PRMODS.AND..NOT. PRCOEF) GO TO 1500                        MODES   00407
C                                                                        MODES   00408
C         PRINT MODES, COEFFICIENTS OR BOTH                              MODES   00409
C                                                                        MODES   00410
      WRITE (NT6,9500) TITLE,NM,XMACH                                    MODES   00411
      IF(.NOT.PRCOEF) GO TO 975                                          MODES   00412
      IF(MTYPEW.EQ.3) GO TO 960                                          MODES   00413
C                                                                        MODES   00414
C         PRINT COEFFICIENTS                                             MODES   00415
C                                                                        MODES   00416
      IF(NSURF.EQ.1) GO TO 960                                           MODES   00417
      CALL RDINIT                                                        MODES   00418
      ITYPE = 5HMIXED                                                    MODES   00419
      CALL READMX(IAICSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,    MODES   00420
     1            LRS,XX,M,N,PARM,IRR)                                   MODES   00421
      IF(IRR.NE.0) GO TO 6070                                            MODES   00422
C                                                                        MODES   00423
      IFLG = IPARM(4)                                                    MODES   00424
      IDG1 = IPARM(3)                                                    MODES   00425
      CALL PRECOF(IDG1,XX,IFLG)                                          MODES   00426
C                                                                        MODES   00427
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  960 CONTINUE                                                          MODES   00428
      IF(NS.EQ.1.AND.MTYPEW.EQ.3) GO TO 975                             MODES   00429
      IF(NS.EQ.2.AND.MTYPET.EQ.3) GO TO 975                             MODES   00430
      CALL PRECOF(IDEG,A,IFLAG)                                         MODES   00431
C                                                                       MODES   00432
  975 CONTINUE                                                          MODES   00433
      NROWS = MXBW                                                      MODES   00434
      IF(NSURF.EQ.2) NROWS = MXBT + IOVLAP                              MODES   00435
C                                                                       MODES   00436
C         CALL ROUTINE TO PRINT THE MODE SHAPES                         MODES   00437
      CALL MODOUT(DEFSL,JS,JOC,NROWS,NM,IOVLAP)                         MODES   00438
C                                                                       MODES   00439
 1500 CONTINUE                                                          MODES   00440
      END FILE IFILE                                                    MODES   00441
      M = 1                                                             MODES   00442
      N = 400                                                           MODES   00443
      CALL WRTEMX(IFILE,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,1,ID,          MODES   00444
     1            IS,ITYPE,M,N,PARM,IRR)                                MODES   00445
      IF(IRR.NE.0) GO TO 6040                                           MODES   00446
C                                                                       MODES   00447
      END FILE IFILE                                                    MODES   00448
      REWIND IFILE                                                      MODES   00449
 2000 CONTINUE                                                          MODES   00450
      GO TO 3000                                                        MODES   00451
 2100 CONTINUE                                                          MODES   00452
C                                                                       MODES   00453
C         DETERMINE THICKNESS SLOPES                                    MODES   00454
C                                                                       MODES   00455
      NBV = IPNTRM(1,NPNTRS) - 1                                        MODES   00456
      REWIND ITSLSC                                                     MODES   00457
      IF(NTSLOP.NE.0) GO TO 2225                                        MODES   00458
C                                                                       MODES   00459
C         WRITE ARRAY OF ONES                                           MODES   00460
C                                                                       MODES   00461
      DO 2200 I=1,NBV                                                   MODES   00462
      DEFSL(1,I) = 1.0                                                  MODES   00463
 2200 CONTINUE                                                          MODES   00464
C                                                                       MODES   00465
      CALL RDINIT                                                       MODES   00466
      ITYPE = SHMIXED                                                   MODES   00467
      M = 1                                                             MODES   00468
      N = NBV                                                           MODES   00469
      CALL WRTEMX(ITSLSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,2,ID,         MODES   00470
     1            DEFSL, ITYPE, M, N, PARM, IRR)                        MODES   00471
      IF(IRR.NE.0) GO TO 6080                                           MODES   00472
C                                                                       MODES   00473
      END FILE ITSLSC                                                   MODES   00474
      REWIND ITSLSC                                                     MODES   00475
      GO TO 3000                                                        MODES   00476
C                                                                       MODES   00477
 2225 CONTINUE                                                          MODES   00478
      DO 2600 NS=1,NSURF                                                MODES   00479
      IF(NS.EQ.NSURF) GO TO 2230                                        MODES   00480
      IFILE = IVPSC                                                     MODES   00481
      REWIND IVPSC                                                      MODES   00482
      GO TO 2240                                                        MODES   00483
 2230 CONTINUE                                                          MODES   0048
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      IFILE = ITSLSC                                                    MODES   00485
 2240 CONTINUE                                                          MODES   00486
C                                                                       MODES   00487
      DO 2700 NSL=1,NTSLOP                                              MODES   00488
C                                                                       MODES   00489
C         ZERO OUT THE ARRAY                                            MODES   00490
      DO 2250 I=1,500                                                   MODES   00491
      DEFSL(1,I) = 0.0                                                  MODES   00492
 2250 CONTINUE                                                          MODES   00493
C                                                                       MODES   00494
      IF(NS.EQ.2) GO TO 2325                                            MODES   00495
      NCH = MYBW                                                        MODES   00496
      NC  = 1                                                           MODES   00497
      GO TO 2350                                                        MODES   00498
 2325 CONTINUE                                                          MODES   00499
      NC  = MYBW + 1                                                    MODES   00500
      NCH = MYBW + MYBT                                                 MODES   00501
      READ (IVPSC) DEFSL                                                MODES   00502
 2350 CONTINUE                                                          MODES   00503
C                                                                       MODES   00504
      DO 2500 J=NC,NCH                                                  MODES   00505
      IST   = IS(J)                                                     MODES   00506
      NK    = NOC(J) + IST - 1                                          MODES   00507
      JSUM  = 0                                                         MODES   00508
      ITROW = IST                                                       MODES   00509
      IF(.NOT.COPLAN.AND.NS.EQ.2) ITROW = IST + IOVLAP                  MODES   00510
      DO 2400 I=1,ITROW                                                 MODES   00511
 2400 JSUM = JSUM + JOC(I)                                              MODES   00512
      JSUM = JSUM - JOC(ITROW) + 1                                      MODES   00513
      READ (NT5,9015) (DOB(I),I=IST,NK)                                 MODES   00514
      DO 2500 I=IST,NK                                                  MODES   00515
      IX = I                                                            MODES   00516
      IF(.NOT.COPLAN.AND.NS.EQ.2) IX = I + IOVLAP                       MODES   00517
      ISUB = JSUM + J - JS(IX) - NC + 1                                 MODES   00518
      DEFSL(1,ISUB) = 1. + GAMC * DOB(I)                                MODES   00519
      JSUM = JSUM + JOC(IX)                                             MODES   00520
 2500 CONTINUE                                                          MODES   00521
C                                                                       MODES   00522
      IF(NS.EQ.NSURF) GO TO 2550                                        MODES   00523
      WRITE (IVPSC) DEFSL                                               MODES   00524
      GO TO 2600                                                        MODES   00525
 2550 CONTINUE                                                          MODES   00526
      CALL RDINIT                                                       MODES   00527
      ITYPE = SHMIXED                                                   MODES   00528
      M = 1                                                             MODES   00529
      N = NBV                                                           MODES   00530
      CALL WRTEMX(IFILE,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,2,ID,          MODES   00531
     1            DEFSL, ITYPE,M,N,PARM,IRR)                            MODES   00532
      IF(IRR.NE.0) GO TO 6060                                           MODES   00533
C                                                                       MODES   00534
 2600 CONTINUE                                                          MODES   00535
C                                                                       MODES   00536
 2700 CONTINUE                                                          MODES   00537
      END FILE IFILE                                                    MODES   00538
      REWIND IFILE                                                      MODES   00539
 2800 CONTINUE                                                          MODES   00540
 3000 CONTINUE                                                          MODES   00541
```

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C                                                                       MODES   00542
 9015 FORMAT(7E10.0)                                                    MODES   00544
      RETURN                                                            MODES   00545
C                                                                       MODES   00546
C         INPUT DATA ERRORS                                             MODES   00547
C                                                                       MODES   00548
 6000 WRITE (NT6,9000) IDEG                                             MODES   00549
      GO TO 6199                                                        MODES   00550
 6005 WRITE (NT6,9000) IDEG, NPTS                                       MODES   00551
      GO TO 6199                                                        MODES   00552
C                                                                       MODES   00553
C         AN ERROR FROM READING OR WRITING A MATRIX FROM TAPE OR        MODES   00554
C         DISK FILE OCCURRED.  PRINT MESSAGES AND FLUSH                 MODES   00555
C                                                                       MODES   00556
 6010 CONTINUE                                                          MODES   00557
      WRITE (NT6,9010) IGEOSC,IRR                                       MODES   00558
      WRITE (NT6,9011) MNAME                                            MODES   00559
      GO TO 6100                                                        MODES   00560
 6020 CONTINUE                                                          MODES   00561
      WRITE (NT6,9020) MODESC,IRR                                       MODES   00562
      WRITE (NT6,9021) NM                                               MODES   00563
      GO TO 6100                                                        MODES   00564
C                                                                       MODES   00565
 6030 CONTINUE                                                          MODES   00566
      WRITE (NT6,9020) MODESC,IRR                                       MODES   00567
      WRITE (NT6,9022)                                                  MODES   00568
C                                                                       MODES   00569
      GO TO 6100                                                        MODES   00570
 6040 CONTINUE                                                          MODES   00571
      WRITE (NT6,9020) MODESC,IRR                                       MODES   00572
      WRITE (NT6,9023)                                                  MODES   00573
      GO TO 6100                                                        MODES   00574
C                                                                       MODES   00575
 6050 CONTINUE                                                          MODES   00576
      WRITE (NT6,9050) IGEOSC,IRR                                       MODES   00577
      WRITE (NT6,9051) NM                                               MODES   00578
      GO TO 6100                                                        MODES   00579
C                                                                       MODES   00580
 6060 WRITE (NT6,9050) IAICSC,IRR                                       MODES   00581
      WRITE (NT6,9051) NM                                               MODES   00582
      GO TO 6100                                                        MODES   00583
C                                                                       MODES   00584
 6070 CONTINUE                                                          MODES   00585
      WRITE (NT6,9070) IAICSC,IRR                                       MODES   00586
      WRITE (NT6,9071) NM                                               MODES   00587
      GO TO 6100                                                        MODES   00588
C                                                                       MODES   00589
 6080 CONTINUE                                                          MODES   00590
      WRITE (NT6,9080) ITSLSC,IRR                                       MODES   00591
      WRITE (NT6,9081) NSL                                              MODES   00592
C                                                                       MODES   00593
C                                                                       MODES   00594
 6100 CONTINUE                                                          MODES   00595
      WRITE(NT6,9101) ID(1),ID(2)                                       MODES   00596
      WRITE(NT6,9102) PARM,IPARM                                        MODES   00597
      WRITE(NT6,9103) NFS,NHS                                           MODES   00598
      WRITE(NT6,9104) ITYPE,M,N                                         MODES   005
```

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 6199 CONTINUE                                                          MODES   00600
      WRITE(NT6,9900)                                                   MODES   00601
C                                                                       MODES   00602
      CALL FLUSH(1)                                                     MODES   00603
C                                                                       MODES   00604
 7005 FORMAT(*0 PREVIOUS MODES AND GEOMETRY HAVE BEEN SPECIFIED. * )    MODES   00605
 7010 FORMAT(86H0*** WARNING - PREVIOUS MODE SHAPES HAVE BEEN SPECIFIED, MODES   00606
     1 BUT GEOMETRY HAS CHANGED. *** )                                  MODES   00607
 7015 FORMAT(80H0*** ERROR - PREVIOUS MODE SHAPES HAVE BEEN SPECIFIED, B MODES   00608
     1UT THE GEOM HAS CHANGED. / 13X,41HPREVIOUS MODE SHAPES WERE AT BOX MODES   00609
     2 CENTERS., 26X,4H *** )                                           MODES   00610
 9000 FORMAT(43H0*** ERROR - SPECIFIED POLYNOMIAL DEGREE OF  I5,        MODES   00611
     1   22H IS OUTSIDE LIMITS, OR, I6,24H IS TOO MANY POINTS *** )     MODES   00612
 9010 FORMAT(53H0*** ERROR - WHILE READING THE GEOMETRY SCRATCH FILE A10 MODES   00613
     1, 15H, ERROR CODE = I4,4H *** )                                   MODES   00614
 9011 FORMAT(5X,32HAN ATTEMPT WAS MADE TO READ THE A6, 8H MATRIX.//)    MODES   00615
 9020 FORMAT(52H0*** ERROR - WHILE WRITING ON THE MODE SCRATCH FILE A10, MODES   00616
     1  15H, ERROR CODE = I4,4H *** )                                  MODES   00617
 9021 FORMAT(5X,40HAN ATTEMPT WAS MADE TO WRITE MODE SHAPE I3,//)       MODES   00618
 9022 FORMAT(5X,47HAN ATTEMPT WAS MADE TO WRITE THE POINTER ARRAY. // ) MODES   00619
 9023 FORMAT(5X,41HAN ATTEMPT WAS MADE TO WRITE INDEX ARRAY.  //)       MODES   00620
 9030 FORMAT(57H0*** ERROR - WHILE WRITING THE COEFFICIENT ARRAY ON FILE MODES   00621
     1       A10,15H, ERROR CODE = I4,4H *** )                          MODES   00622
 9031 FORMAT(5X,44HAN ATTEMPT WAS MADE TO WRITE FOR MODE SHAPE I4 )     MODES   00623
 9070 FORMAT(59H0*** ERROR - WHILE READING THE COEFFICIENT ARRAY FROM FI MODES   00624
     1LE     A10,15H, ERROR CODE = I4,4H *** )                          MODES   00625
 9071 FORMAT(5X,43HAN ATTEMPT WAS MADE TO READ FOR MODE SHAPE I4  )     MODES   00626
 9080 FORMAT(56H0*** ERROR - WHILE WRITING ON THE THICKNESS SLOPE FILE  MODES   00627
     1 2X,A10,15H, ERROR CODE = ,I4,4H *** )                            MODES   00628
 9081 FORMAT(5X,45HAN ATTEMPT WAS MADE TO WRITE THICKNESS SLOPE I4,//)  MODES   00629
 9500 FORMAT(1H1,8A10,// 46X,*  MODE SHAPE NUMBER *,I3,                 MODES   00630
     1                 / 46X,*MACH NUMBER =*,F11.6,/46X,24(1H-),/ )     MODES   00631
 9101 FORMAT(5X,*MATRIX ID = *, A10, I10)                               MODES   00632
 9102 FORMAT(5X,*PARAMETERS *,10E11.3, /10X,*(INTEGER)*, I7, 9I11 )     MODES   00633
 9103 FORMAT(5X,*FILE SPACING = *,I3,* MATRIX SPACING = *,I3)           MODES   00634
 9104 FORMAT(5X,*MATRIX TYPE -*,A10,*, DIMENSIONED (*I4,2H X,I4,1H) )   MODES   00635
 9900 FORMAT(*0    ERROR OCCURRED IN MODES SECTION (MAIN PROGRAM).* )   MODES   00636
      END                                                               MODES   00637
```

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      SUBROUTINE TAPMOD(NS,NM,DEFSL)                                    TAPMOD  00002
      DIMENSION DEFSL(2,500), D(500), S(500)                            TAPMOD  00003
C                                                                       TAPMOD  00004
C         THIS PROGRAM WILL READ MODE SHAPES FROM TAPE IN THE SAME      TAPMOD  00005
C         FORMAT AS PROGRAM TEV059. THE PROGRAM WILL BE REPLACED BY     TAPMOD  00006
C         THE AIR FORCE FOR ITS USE AND BOEING MAY MODIFY OR REPLACE    TAPMOD  00007
C         AS INPUT TAPES ARE MODIFIED OR REPLACED.                      TAPMOD  00008
C                                                                       TAPMOD  00009
C         NS    - =1, FIRST PLANFORM                                    TAPMOD  00010
C                 =2, SECOND PLANFORM                                   TAPMOD  00011
C         NM    - MODE SHAPE NUMBER                                     TAPMOD  00012
C         DEFSL - ARRAY WHERE MODE SHAPES FOR ENTIRE PLANFORM(S) IS     TAPMOD  00013
C                 STORED.                                               TAPMOD  00014
C                                                                       TAPMOD  00015
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,         GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,             GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,        GEOMTY  00004
     3                IXBW,XCENTR                                      GEOMTY  00005
      LOGICAL COPLAN                                                    GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,MXBT,MYBT,MYBBT,MXBST,MYBST,      GEOM2   00002
     1                MYBBST,IXBT,IXBST,CAPL                           GEOM2   00003
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,        FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC         FILES   00003
      COMMON /TAPEIO/ NFS,NMS,LS,NMR,ID(20),NID,ITYPE,LRS,LWS,M,N,      TAPEIO  00002
     1                PARM(10),IRR                                     TAPEIO  00003
      DIMENSION IPARM(10)                                               TAPEIO  00004
      EQUIVALENCE (PARM,IPARM)                                          TAPEIO  00005
      COMMON /INDEX/ IS(100),NOC(100),JS(100),JOC(100)                  TAPMOD  00020
C                                                                       TAPMOD  00021
      LOGICAL MXREAD,RANDIN                                             TAPMOD  00022
      MXREAD = .FALSE.                                                  TAPMOD  00023
      RANDIN = .FALSE.                                                  TAPMOD  00024
C                                                                       TAPMOD  00025
      CALL RDINIT                                                       TAPMOD  00026
      IF(NM.NE.1) GO TO 710                                             TAPMOD  00027
      IF(NS.EQ.1) REWIND INTAPE                                         TAPMOD  00028
      NMS = 2                                                           TAPMOD  00029
      NFS = INFSP                                                       TAPMOD  00030
  710 CONTINUE                                                          TAPMOD  00031
      ITYPE = 5HMIXED                                                   TAPMOD  00032
      CALL READMX(INTAPE,MXREAD,RANDIN,NFS,NMS,LS,NMR,1, NID,ID,ITYPE,  TAPMOD  00033
     1            LRS, D, M,N,PARM,IRR)                                 TAPMOD  00034
      IF(IRR.NE.0) GO TO 6020                                           TAPMOD  00035
      CALL RDINIT                                                       TAPMOD  00036
      ITYPE = 5HMIXED                                                   TAPMOD  00037
      CALL READMX(INTAPE,MXREAD,RANDIN,NFS,NMS,LS,NMR,1, NID,ID,ITYPE,  TAPMOD  00038
     1            LRS, S, M,N,PARM,IRR)                                 TAPMOD  00039
      IF(IRR.NE.0) GO TO 6020                                           TAPMOD  00040
C                                                                       TAPMOD  00041
      IF(NS.EQ.2) GO TO 720                                             TAPMOD  00042
C                                                                       TAPMOD  00043
C         FIRST PLANFORM                                                TAPMOD  00044
      NCH = MYBW                                                        TAPMOD  00045
      NC  = 1                                                           TAPMOD  00046
      GO TO 725                                                         TAPMOD  00047
C                                                                       TAPMOD  00048
C         SECOND PLANFORM                                               TAPMOD  00049
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  720 CONTINUE                                                          TAPMOD  00050
      NC = MYBW + 1                                                     TAPMOD  00051
      NCH = MYBW + MYBT                                                 TAPMOD  00052
C                                                                       TAPMOD  00053
C         STORE DEFLECTIONS AND SLOPES                                  TAPMOD  00054
  725 CONTINUE                                                          TAPMOD  00055
      ITS = 0                                                           TAPMOD  00056
      DO 750 J=NC,NCH                                                   TAPMOD  00057
      IST = IS(J)                                                       TAPMOD  00058
      NK = NOC(J) + IST - 1                                             TAPMOD  00059
      JSUM = 0                                                          TAPMOD  00060
      DO 730 I=1,IST                                                    TAPMOD  00061
  730 JSUM = JSUM + JOC(I)                                              TAPMOD  00062
      JSUM = JSUM - JOC(IST) + 1                                        TAPMOD  00063
      DO 750 I=IST,NK                                                   TAPMOD  00064
      ITS = ITS + 1                                                     TAPMOD  00065
      ISUB = JSUM + J - NC + 1 - JS(I)                                  TAPMOD  00066
      DEFSL(1,ISUB) = D(ITS)                                            TAPMOD  00067
      DEFSL(2,ISUB) = S(ITS)                                            TAPMOD  00068
      JSUM= JSUM + JOC(I)                                               TAPMOD  00069
  750 CONTINUE                                                          TAPMOD  00070
C                                                                       TAPMOD  00071
      RETURN                                                            TAPMOD  00072
C                                                                       TAPMOD  00073
C         AN ERROR DURING READING A MATRIX FROM TAPE OR                 TAPMOD  00074
C         DISK FILE OCCURRED. PRINT MESSAGES AND FLUSH                  TAPMOD  00075
C                                                                       TAPMOD  00076
 6010 CONTINUE                                                          TAPMOD  00077
 6020 CONTINUE                                                          TAPMOD  00078
      WRITE (NT6,9020) MODESC,IRR                                       TAPMOD  00079
      WRITE (NT6,9021) NM                                               TAPMOD  00080
 6100 CONTINUE                                                          TAPMOD  00081
      WRITE(NT6,9101) ID(1),ID(2)                                       TAPMOD  00082
      WRITE(NT6,9102) PARM,IPARM                                        TAPMOD  00083
      WRITE(NT6,9103) NFS,NMS                                           TAPMOD  00084
      WRITE(NT6,9104) ITYPE,M,N                                         TAPMOD  00085
      WRITE(NT6,9900)                                                   TAPMOD  00086
C                                                                       TAPMOD  00087
      CALL FLUSH(1)                                                     TAPMOD  00088
C                                                                       TAPMOD  00089
 9020 FORMAT(54H0*** ERROR - WHILE READING FROM THE MODE SCRATCH FILE   TAPMOD  00090
     1 A10,15H, ERROR CODE = I4,4H *** )                                TAPMOD  00091
 9021 FORMAT(5X,39HAN ATTEMPT WAS MADE TO READ MODE SHAPE I3,//)        TAPMOD  00092
 9101 FORMAT(5X,*MATRIX ID = *, A10, I10)                               TAPMOD  00093
 9102 FORMAT(5X,*PARAMETERS *,10E11.3, /10X,*(INTEGER)*, I7, 9I11 )     TAPMOD  00094
 9103 FORMAT(5X,*FILE SPACING = *,I3,* MATRIX SPACING = *,I3)           TAPMOD  00095
 9104 FORMAT(5X,*MATRIX TYPE -*,A10,*, DIMENSIONED (*I4,2H X,I4,1H) )   TAPMOD  00096
 9900 FORMAT(*0    ERROR OCCURRED IN MODES SECTION (SUBROUTINE TAPMOD).* FTNX1  00044
     1    )                                                             FTNX1  00045
      END                                                               TAPMOD  00098
```

```
      SUBROUTINE ROPER                                                  ROPER   00002
C                                                                       ROPER   00003
C         SUBROUTINE TO DETERMINE THE BOXES ON EACH ROW THAT SHOULD     ROPER   00004
C         HAVE MODE SHAPES.                                             ROPER   00005
C                                                                       ROPER   00006
C         IS(J)  -  ROW INDES OF FIRST PLANFORM BOX FOR CHORD J.        ROPER   00007
C         NOC(J) -  NUMBER OF PLANFORM BOXES ON CHORD J                 ROPER   00008
C         JS(I)  -  COL INDEX OF FIRST PLANFORM BOX FOR SPAN I.         ROPER   00009
C         JOC(I) -  NUMBER OF BOXES BETWEEN FIRST AND LAST PLANFORM     ROPER   00010
C                   BOX ON SPAN I                                       ROPER   00011
C                                                                       ROPER   00012
C                                                                       ROPER   00013
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,         GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,             GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,        GEOMTY  00004
     3                IXBW,XCENTR                                      GEOMTY  00005
      LOGICAL COPLAN                                                    GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,MXBT,MYBT,MYBBT,MXBST,MYBST,      GEOM2   00002
     1                MYBBST,IXBT,IXBST,CAPL                           GEOM2   00003
      COMMON /INDEX/ IS(100),NOC(100),JS(100),JOC(100)                  ROPER   00016
      IF(COPLAN) GO TO 100                                              ROPER   00017
      NCH = MYBW                                                        ROPER   00018
      MXB = MXBW                                                        ROPER   00019
      GO TO 200                                                         ROPER   00020
  100 CONTINUE                                                          ROPER   00021
      NCH = MYBW + MYBT                                                 ROPER   00022
      MXB = MXBT                                                        ROPER   00023
  200 CONTINUE                                                          ROPER   00024
      DO 500 I = 1,MXB                                                  ROPER   00025
      JS(I) =0                                                          ROPER   00026
      JOC(I)=0                                                          ROPER   00027
      JCUT = 0                                                          ROPER   00028
      DO 400 J=1,NCH                                                    ROPER   00029
      IF(I.LT.IS(J)) GO TO 400                                          ROPER   00030
      ILAST = IS(J) + NOC(J) -1                                         ROPER   00031
      IF(I.GT.ILAST) GO TO 400                                          ROPER   00032
      IF(JS(I).NE.0) GO TO 300                                          ROPER   00033
      JS(I) = J                                                         ROPER   00034
      IF(J.GT.MYBW) JS(I) = J - MYBW                                    ROPER   00035
  300 CONTINUE                                                          ROPER   00036
      IF(JCUT.EQ.1) GO TO 400                                           ROPER   00037
      JV = J                                                            ROPER   00038
      IF(J.GT.MYBW) JV    = J - MYBW                                    ROPER   00039
      IF(JV.LT.JS(I)) GO TO 350                                         ROPER   00040
      JOC(I) = JV-JS(I) +1                                              ROPER   00041
      GO TO 400                                                         ROPER   00042
  350 CONTINUE                                                          ROPER   00043
      JOC(I) = JS(I)-JV + JOC(I)                                        ROPER   00044
      JS(I) = JV                                                        ROPER   00045
      JCUT = 1                                                          ROPER   00046
  400 CONTINUE                                                          ROPER   00047
  425 CONTINUE                                                          ROPER   00048
  500 CONTINUE                                                          ROPER   00049
C                                                                       ROPER   00050
C         CALCULATE FOR SECOND PLANFORM. THIS IS ONLY USED FOR          ROPER   00051
C         NON COPLANAR PLANFORMS.                                       ROPER   00052
      IF(NSURF.EQ.1) GO TO 1500                                         ROPER   00053
```

```
      IF(COPLAN)      GO TO 1500
      NCH = MYBW + MYBT
      JCH = MYBW + 1
      IFBT = (IXBT-IXBW)/NSUBDV +1
      IOVLAP = 0
      IF(IFBT.LE.MXBW)  IOVLAP = MXBW - IFBT + 1
      DO 1000 I=IFBT,MXBT
      IX = I + IOVLAP
      JS(IX) = 0
      JCC(IX)= 0
      DO 800 J=JCH,NCH
      IF(I.LT.IS(J)) GO TO 800
      ILAST = IS(J) + NCC(J) -1
      IF(I.GT.ILAST) GO TO 800
      IF(JS(IX).EQ.0) JS(IX) = J-MYBW
      JV = J- MYBW
      JCC(IX) = JV - JS(IX) + 1
  800 CONTINUE
  825 CONTINUE
 1000 CONTINUE
 1500 CONTINUE
      RETURN
      END
```

```
ROPER   00054
ROPER   00055
ROPER   00056
ROPER   00057
ROPER   00058
ROPER   00059
ROPER   00060
ROPER   00061
ROPER   00062
ROPER   00063
ROPER   00064
ROPER   00065
ROPER   00066
ROPER   00067
ROPER   00068
ROPER   00069
ROPER   00070
ROPER   00071
ROPER   00072
ROPER   00073
ROPER   00074
ROPER   00075
ROPER   00076
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      SUBROUTINE FITTER(M,N,X,Y,Z,C,CN,IDIM)                              FITTER  00002
      DIMENSION X(100), Y(100), Z(IDIM,100), C(IDIM,66)                   FITTER  00003
      DIMENSION AI(68),A(66,68),XP(11),YP(11)                             FITTER  00004
      DIMENSION  VS(10)                                                   FITTER  00005
      LOGICAL COMPLX                                                      FITTER  00006
C                                                                         FITTER  00007
C        M  - DEGREE OF POLYNOMIAL EQUATION                               FITTER  00008
C        N  - NUMBER OF DATA POINTS TO FIT CURVE THROUGH                  FITTER  00009
C        X  - X COORDINATE OF DATA POINT                                  FITTER  00010
C        Y  - Y COORDINATE OF DATA POINT                                  FITTER  00011
C        Z  - Z COORDINATE OF DATA POINT                                  FITTER  00012
C        C  - OUTPUT COEFFICIENT ARRAY                                    FITTER  00013
C       CN - SCALE FACTOR                                                 FITTER  00014
C         CN - SCALE FACTOR                                               FITTER  00015
C         IDIM - INDICATOR OF REAL OR COMPLEX FUNCTION                    FITTER  00016
C              = 1, FUNCTION IS REAL                                      FITTER  00017
C              = 2, FUNCTION IS COMPLEX                                   FITTER  00018
C               IF COMPLEX SET DIMENSIONS OF FUNCTION AND COEFFICIENTS    FITTER  00019
C               TO  (IDIM * ---- )                                        FITTER  00020
C                                                                         FITTER  00021
C         DETERMINE NUMBER OF COEFFIENTS                                  FITTER  00022
C                                                                         FITTER  00023
      EPS = 1.0E-04                                                       FITTER  00024
      COMPLX = .FALSE.                                                    FITTER  00025
      IF(IDIM.EQ.2) COMPLX =  TRUE.                                       FITTER  00026
C                                                                         FITTER  00027
C         SCALE DATA TO REDUCE MAGNITUDE OF MATRIX TERMS.                 FITTER  00028
C         SHOULD AVOID BOMB OUTS DUE TO OVERFLOW CONDITIONS.              FITTER  00029
      IF(CN.EQ.0) CN=1.0                                                  FITTER  00030
      IF(CN.EQ.1.0) GO TO 15                                              FITTER  00031
      DO 5 I=1,N                                                          FITTER  00032
      X(I) = X(I)/CN                                                      FITTER  00033
      Y(I) = Y(I)/CN                                                      FITTER  00034
    5 CONTINUE                                                            FITTER  00035
   15 CONTINUE                                                            FITTER  00036
      XM = M + 4                                                          FITTER  00037
      XM2= XM/2.                                                          FITTER  00038
      NC = XM*XM2 + XM2 + EPS                                             FITTER  00039
      IF(NC.LE.N) GO TO 25                                                FITTER  00040
      M = M-1                                                             FITTER  00041
      GO TO 15                                                            FITTER  00042
   25 CONTINUE                                                            FITTER  0004
C                                                                         FITTER  00044
      MAC = NC                                                            FITTER  00045
C                                                                         FITTER  00046
         DETERMINE THE MAXIMUM DEGREE THAT CAN BE COMPUTED IN             FITTER  00047
         EACH DIRECTION AND SET UP ORDER OF SOLUTION.                     FITTER  00048
C                                                                         FITTER  00049
      NDV = 1                                                             FITTER  00050
      NDX = M                                                             FITTER  00051
      VS(1) = X(1)                                                        FITTER  00052
      DO 6  I=1,N                                                         FITTER  00053
      DO 5  J=1,NDV                                                       FITTER  00054
      IF(X(I).EQ.VS(J)) GO TO 55                                          FITTER  00055
   50 CONTINUE                                                            FITTER  00056
      NDV = NDV + 1                                                       FITTER  00057
      VS(NDV) = X(I)                                                      FITTER  00058
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      IF(NDV-1.EQ.M) GO TO 65                                          FITTER  00059
   55 CONTINUE                                                         FITTER  00060
   60 CONTINUE                                                         FITTER  00061
      MDX = NDV -1                                                     FITTER  00062
   65 CONTINUE                                                         FITTER  00063
C                                                                      FITTER  00064
      NDV = 1                                                          FITTER  00065
      MDY = M                                                          FITTER  00066
      VS(1) = Y(1)                                                     FITTER  00067
      DO 80 I=1,N                                                      FITTER  00068
      DO 70 J=1,NDV                                                    FITTER  00069
      IF(Y(I).EQ.VS(J)) GO TO 75                                       FITTER  00070
   70 CONTINUE                                                         FITTER  00071
      NDV = NDV + 1                                                    FITTER  00072
      VS(NDV) = Y(I)                                                   FITTER  00073
      IF(NDV-1.EQ.M) GO TO 85                                          FITTER  00074
   75 CONTINUE                                                         FITTER  00075
   80 CONTINUE                                                         FITTER  00076
      MDY = NDV - 1                                                    FITTER  00077
   85 CONTINUE                                                         FITTER  00078
C                                                                      FITTER  00079
      ITOT =NC +1                                                      FITTER  00080
      ITOT1 = ITOT                                                     FITTER  00081
      IF(COMPLX) ITOT = ITOT + 1                                       FITTER  00082
C                                                                      FITTER  00083
C        ZERO OUT THE A ARRAY                                          FITTER  00084
C                                                                      FITTER  00085
      DO 95 I=1,NC                                                     FITTER  00086
      C(1,I) = 0.0                                                     FITTER  00087
      IF(.NOT.COMPLX) GO TO 90                                         FITTER  00088
      C(2,I) = 0.0                                                     FITTER  00089
   90 CONTINUE                                                         FITTER  00090
      DO 95 J=1,ITOT                                                   FITTER  00091
   95 A(I,J) = 0.0                                                     FITTER  00092
C                                                                      FITTER  00093
C        DETERMINE DEVIATION EQUATION AND SQUARE THE EQUATION          FITTER  00094
C                                                                      FITTER  00095
      AI(1) =1.0                                                       FITTER  00096
      XP(1) =1.0                                                       FITTER  00097
      YP(1) =1.0                                                       FITTER  00098
      MM = M + 1                                                       FITTER  00099
      DO 200 K=1,N                                                     FITTER  00100
      DO 10 L=2,MM                                                     FITTER  00101
      XP(L) = XP(L-1)*X(K)                                             FITTER  00102
      YP(L) = YP(L-1)*Y(K)                                             FITTER  00103
   10 CONTINUE                                                         FITTER  00104
C                                                                      FITTER  00105
      I = 1                                                            FITTER  00106
      DO 40 L=2,MM                                                     FITTER  00107
      DO 20 LL=1,L                                                     FITTER  00108
      IL= L - LL +1                                                    FITTER  00109
      IF(LL-1.GT.MDY) GO TO 30                                         FITTER  00110
      IF(IL-1.GT.MDX) GO TO 20                                         FITTER  00111
      I = I + 1                                                        FITTER  00112
      AI(I) = XP(IL)*YP(LL)                                            FITTER  00113
   20 CONTINUE                                                         FITTER  00114
   30 CONTINUE                                                         FITTER  00115
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   40 CONTINUE                                                          FITTER  00116
      AI(I+1) = Z(1,K)                                                  FITTER  00117
      IF(COMPLX) AI(I+2) = Z(2,K)                                       FITTER  00118
      IF(K.GT.1) GO TO 45                                               FITTER  00119
      NC = I                                                            FITTER  00120
      ITOT = NC + 1                                                     FITTER  00121
      ITOT1 = ITOT                                                      FITTER  00122
      IF(COMPLX) ITOT = ITOT + 1                                        FITTER  00123
   45 CONTINUE                                                          FITTER  00124
C                                                                       FITTER  00125
      DO 1100 I=1,NC                                                    FITTER  00126
      DO 1100 J=I,ITOT                                                  FITTER  00127
      ASAV = AI(I)*AI(J)                                                FITTER  00128
      A(I,J)=A(I,J)+ASAV                                                FITTER  00129
 1100 CONTINUE                                                          FITTER  00130
  200 CONTINUE                                                          FITTER  00131
C                                                                       FITTER  00132
C         SQUARE ROOT METHOD                                            FITTER  00133
C         INTERMEDIATE MATRIX                                           FITTER  00134
      DO 1200 I=1,NC                                                    FITTER  00135
      IM1 = I-1                                                         FITTER  00136
      TMP=0.0                                                           FITTER  00137
      IF(I.EQ.1) GO TO 1150                                             FITTER  00138
      DO 1120 L=1,IM1                                                   FITTER  00139
 1120 TMP= TMP+ A(L,I)**2                                               FITTER  00140
 1150 CONTINUE                                                          FITTER  00141
      T = A(I,I) - TMP                                                  FITTER  00142
      IF(T.GT.EPS) GO TO 4                                              FITTER  00143
      A(I,I) = 0.0                                                      FITTER  00144
      GO TO 1200                                                        FITTER  00145
    4 CONTINUE                                                          FITTER  00146
      A(I,I) = SQRT(T)                                                  FITTER  00147
      IF(A(I,I).GT.EPS) GO TO 1155                                      FITTER  00148
      A(I,ITOT) = 0.0                                                   FITTER  00149
      GO TO 1200                                                        FITTER  00150
 1155 CONTINUE                                                          FITTER  00151
C                                                                       FITTER  00152
      JS = I+1                                                          FITTER  00153
      DO 1180 J = JS,ITOT                                               FITTER  00154
      TMP= 0.0                                                          FITTER  00155
      IF(I.EQ.1) GO TO 1175                                             FITTER  00156
      DO 1160 L=1,IM1                                                   FITTER  00157
 1160 TMP = TMP + A(L,I)*A(L,J)                                         FITTER  00158
 1175 A(I,J) =(A(I,J)-TMP)/A(I,I)                                       FITTER  00159
 1180 CONTINUE                                                          FITTER  00160
 1200 CONTINUE                                                          FITTER  00161
C                                                                       FITTER  00162
C                                                                       FITTER  00163
C         BACK SUBSTITUTE FOR COEFFICIENTS                              FITTER  00164
      DO 1400 K=1,NC                                                    FITTER  00165
      I = NC - K + 1                                                    FITTER  00166
      IP1=I 1                                                           FITTER  00167
      TMP1  = 0.0                                                       FITTER  00168
      TMP2  = 0.0                                                       FITTER  00169
      IF(A(I,I).GT.EPS) GO TO 1325                                      FITTER  00170
      C(1,I) = 0.0                                                      FITTER  0017?
      IF(COMPLX) C(2,I) = 0.0                                           FITTER  0017?
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      GO TO 1400                                                        FITTER  00173
 1325 CONTINUE                                                          FITTER  00174
      IF(I.EQ.NC)GO TO 1375                                             FITTER  00175
      DO 1350 L=IP1,NC                                                  FITTER  00176
      TMP1  = TMP1 + A(I,L)*C(1,L)                                      FITTER  00177
      IF(.NOT.COMPLX) GO TO 1350                                        FITTER  00178
      TMP2  = TMP2 + A(I,L)*C(2,L)                                      FITTER  00179
 1350 CONTINUE                                                          FITTER  00180
 1375 CONTINUE                                                          FITTER  00181
      C(1,I) =(A(I,ITOT1)-TMP1)/A(I,I)                                  FITTER  00182
      IF(.NOT.COMPLX) GO TO 1400                                        FITTER  00183
      C(2,I) =(A(I,ITOT) -TMP2)/A(I,I)                                  FITTER  00184
 1400 CONTINUE                                                          FITTER  00185
C                                                                       FITTER  00186
C                                                                       FITTER  00187
C        REORDER THE COEFFICIENTS IN CORRECT POWERS                     FITTER  00188
C        OF X AND Y.                                                    FITTER  00189
C                                                                       FITTER  00190
      IF(NAC.EQ.NC) GO TO 1475                                          FITTER  00191
C                                                                       FITTER  00192
      IZ = 1                                                            FITTER  00193
      I  = 1                                                            FITTER  00194
      DO 1440 L=2,MM                                                    FITTER  00195
      DO 1420 LL=1,L                                                    FITTER  00196
      IL = L -LL +1                                                     FITTER  00197
      I = I +1                                                          FITTER  00198
      IF(LL-1.LE.MDY.AND.IL-1.LE.MDX) GO TO 1410                        FITTER  00199
      X(I) = 0.0                                                        FITTER  00200
      Y(I) = 0.0                                                        FITTER  00201
      GO TO 1420                                                        FITTER  00202
 1410 CONTINUE                                                          FITTER  00203
      IZ = IZ + 1                                                       FITTER  00204
      X(I) = C(1,IZ)                                                    FITTER  00205
      IF(COMPLX) Y(I) = C(2,IZ)                                         FITTER  00206
 1420 CONTINUE                                                          FITTER  00207
 1440 CONTINUE                                                          FITTER  00208
C                                                                       FITTER  00209
      DO 1450 I=2,NAC                                                   FITTER  00210
      C(1,I) = X(I)                                                     FITTER  00211
      IF(COMPLX) C(2,I) = Y(I)                                          FITTER  00212
 1450 CONTINUE                                                          FITTER  00213
 1475 CONTINUE                                                          FITTER  00214
C                                                                       FITTER  00215
C        ELIMINATE THE SCALE FACTOR FROM THE COEFFICIENTS.              FITTER  00216
C                                                                       FITTER  00217
      IF(CN.EQ.1.0) GO TO 1700                                          FITTER  00218
      I=1                                                               FITTER  00219
      CP= 1.0/CN                                                        FITTER  00220
      DO 1600 L1=2,MM                                                   FITTER  00221
      DO 1500 L2=1,L1                                                   FITTER  00222
      I = I+1                                                           FITTER  00223
      C(1,I) = C(1,I)*CP                                                FITTER  00224
      C(2,I) = C(2,I)*CP                                                FITTER  00225
 1500 CONTINUE                                                          FITTER  00226
      CP= CP/CN                                                         FITTER  00227
 1600 CONTINUE                                                          FITTER  00228
 1700 CONTINUE                                                          FITTER  00229
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C                                                                       FITTER  00230
C       THE C ARRAY NOW CONTAINS THE COEFFICIENTS.                      FITTER  00231
C                                                                       FITTER  00232
      RETURN                                                            FITTER  00233
      END                                                               FITTER  00234
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      SUBROUTINE MODOUT(DEFSL,JS,JOC,NROWS,NM,IOVLAP)                    MODOUT  00002
      DIMENSION DEFSL(2,500),JS(100),JOC(100)                            MODOUT  00003
      DIMENSION JPH(15),DS(50)                                           MODOUT  00004
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,          GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,               GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,          GEOMTY  00004
     3                IXBW,XCENTR                                        GEOMTY  00005
      LOGICAL COPLAN                                                     GEOMTY  00006
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,          FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC           FILES   00003
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,ORDFIT,     PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                                PROBLM  00003
      LOGICAL         SMOOTH,ORDFIT,EXAIC,SUBDV,PLYWOOD                  PROBLM  00004
      DIMENSION SLOMAT(3)                                                MODOUT  00008
      EQUIVALENCE  (SLOMAT(2), IMAT)                                     FTN001  00046
      DATA SLOMAT/1OH(I3,3X,   ,1OH         0,1OHP,15F7.3)  /            MODOUT  00009
      DATA IMAT1,IMAT2 /1OH         0, 1OH.        -0 /                  MODOUT  00011
C                                                                        MODOUT  00012
C        MODOUT WILL PRINT THE MODE SHAPES OUT IN ROW/COLUMN FORM        MODOUT  00013
C                                                                        MODOUT  00014
C        DEFSL  - MOD SHAPES IN INTERNAL STORAGE                         MODOUT  00015
C        JS(I)  - FIRST COLUMN FOR WHICH THERE IS A MODE SHAPE ON ROW I  MODOUT  00016
C        JOC(I) - NUMBER OF BOXES BETWEEN FIRST AND LAST PLANFORM        MODOUT  00017
C                 BOX ON ROW I                                           MODOUT  00018
C        NROWS  - NUMBER OF ROWS                                         MODOUT  00019
C        NM     - MODE SHAPE NUMBER                                      MODOUT  00020
C        IOVLAP - NUMBER OF BOXES OVERLAP BETWEEN PLANFORMS FOR          MODOUT  00021
C                 NON-COPLANAR SURFACES                                  MODOUT  00022
C                                                                        MODOUT  00023
      IMAT = 1OH         0                                               MODOUT  00024
      NSETS = 0                                                          MODOUT  00025
      DO 90 I=1,NROWS                                                    MODOUT  00026
      JL = JS(I)+JOC(I)-1                                                MODOUT  00027
      IF(NSETS.LT.JL) NSETS=JL                                           MODOUT  00028
   90 CONTINUE                                                           MODOUT  00029
      JSETS = (NSETS-1)/15 + 1                                           MODOUT  00030
      DO 1000 NP=1,2                                                     MODOUT  00031
C                                                                        MODOUT  00032
C        FIND LARGEST VALUE                                              MODOUT  00033
C                                                                        MODOUT  00034
      VALUE = 0.0                                                        MODOUT  00035
      DO 100 L=1,500                                                     MODOUT  00036
      AVAL = ABS(DEFSL(NP,L))                                            MODOUT  00037
      IF(AVAL.GT.VALUE) VALUE = AVAL                                     MODOUT  00038
  100 CONTINUE                                                           MODOUT  00039
      POW = 1                                                            MODOUT  00040
      TSCALE = 10.                                                       MODOUT  00041
      IF(VALUE.GE.10.) TSCALE = 0.1                                      MODOUT  00042
      DO 110 N=1,8                                                       MODOUT  00043
      POW = POW *TSCALE                                                  MODOUT  00044
      TTEN = VALUE * POW                                                 MODOUT  00045
      IF(TTEN.GE.10.) GO TO 110                                          MODOUT  00046
      IF(TTEN.LT.1. ) GO TO 110                                          MODOUT  00047
      NPA = N                                                            MODOUT  00048
      GO TO 115                                                          MODOUT  00049
  110 CONTINUE                                                           MODOUT  00050
      NPA= 0                                                             MODOUT  00051
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  115 CONTINUE                                                          MODOUT  00052
      IF(VALUE.LE.1.00) GO TO 120                                       MODOUT  00053
C                                                                       MODOUT  00054
C         THE ARRAY MUST BE SCALED DOWN.                                MODOUT  00055
C                                                                       MODOUT  00056
      NPX = -NPA                                                        MODOUT  00057
      IMAT = IMAT2                                                      MODOUT  00058
      GO TO 122                                                         MODOUT  00059
C                                                                       MODOUT  00060
C         THE ARRAY MUST BE SCALED UP.                                  MODOUT  00061
C                                                                       MODOUT  00062
  120 CONTINUE                                                          MODOUT  00063
      NPX = NPA                                                         MODOUT  00064
      IMAT = IMAT1                                                      MODOUT  00065
  122 CONTINUE                                                          MODOUT  00066
      IMAT = IMAT + NPA                                                 MODOUT  00067
      IF(NP.EQ.2) GO TO 124                                             MODOUT  00068
      WRITE (NT6,9005) NPX                                              MODOUT  00069
      GO TO 125                                                         MODOUT  00070
  124 CONTINUE                                                          MODOUT  00071
      WRITE (NT6,9010) NPX                                              MODOUT  00072
  125 CONTINUE                                                          MODOUT  00073
      DO 900 JPS=1,JSETS                                                MODOUT  00074
      JBASE = (JPS-1)*15                                                MODOUT  00075
      DO 150 JC=1,15                                                    MODOUT  00076
  150 JPH(JC) = JC + JBASE                                              MODOUT  00077
      JL=15                                                             MODOUT  00078
      IF(JPS.EQ.JSETS) JL= NSETS - 15*(JSETS-1)                         MODOUT  00079
      WRITE(NT6,9015) (JPH(J) ,J=1,JL)                                  MODOUT  00080
      IOV = 0                                                           MODOUT  00081
      ITOT = 0                                                          MODOUT  00082
      DO 800 I=1,NROWS                                                  MODOUT  00083
C                                                                       MODOUT  00084
C         ZERO OUT PRINT ARRAY                                          MODOUT  00085
      DO 200 J=1,50                                                     MODOUT  00086
  200 DS(J) = 0.0                                                       MODOUT  00087
C                                                                       MODOUT  00088
C         PUT THE VALUES INTO PRINT ARRAY                               MODOUT  00089
      JI = JS(I)                                                        MODOUT  00090
      IF(JI.EQ.0) GO TO 800                                             MODOUT  00091
      JL = JS(I) +JOC(I) -1                                             MODOUT  00092
      DO 300 J=JI,JL                                                    MODOUT  00093
      ITOT = ITOT+1                                                     MODOUT  00094
  300 DS(J) = DEFSL(NP,ITOT)                                            MODOUT  00095
C                                                                       MODOUT  00096
C         PRINT THE ONES IN THIS SET                                    MODOUT  00097
      JIP=(JPS-1)*15 +1                                                 MODOUT  00098
      JIL= JIP +14                                                      MODOUT  00099
      IF(JL.LT.JIP) GO TO 800                                           MODOUT  00100
      IF(JI.GT.JIL) GO TO 800                                           MODOUT  00101
      IF(JIL.GT.JL) JIL=JL                                              MODOUT  00102
      M = I                                                             MODOUT  00103
      IF(I .LAP.EQ.0) GO TO 350                                         MODOUT  00104
      IF(I .LE.MXBW)  GO TO 350                                         MODOUT  00105
      M = I-IOVLAP                                                      MODOUT  00106
      IF(IOV.NE.0) GO TO 350                                            MODOUT  00107
      IOV = 1                                                           MODOUT  00108
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      WRITE(NT6,9015)                                                    MODOUT  00109
  350 CONTINUE                                                           MODOUT  00110
      WRITE(NT6,SLOMAT) M,(DS(J),J=JIP,JIL)                              MODOUT  00111
  800 CONTINUE                                                           MODOUT  00112
  900 CONTINUE                                                           MODOUT  00113
 1000 CONTINUE                                                           MODOUT  00114
      RETURN                                                             MODOUT  00115
 9005 FORMAT(1HC,46X,*DEFLECTIONS X 1.0E *,I2,/ 47X,21(1H-) )            MODOUT  00116
 9010 FORMAT(1HO,//47X,*   SLOPES X 1.0E *,I2,/ 47X,21(1H-) )            MODOUT  00117
 9015 FORMAT(1HO,5X,15(I4,3X));                                          MODOUT  00118
 9020 FORMAT(I3,3X,15F7.3)                                               MODOUT  00119
      END                                                                MODOUT  00120
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      SUBROUTINE PRECOF(IDEG,A,IFR)                                     PRECOF  00002
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,         FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC         FILES   00003
      DIMENSION A(21),BLNK(7),BNK2(6)                                   PRECOF  00004
      EQUIVALENCE (BLNK(2),BNK2(1))                                     PRECOF  00006
      DIMENSION IXP(7),IYP(7)                                           PRECOF  00007
      DATA        BLNK / 7* 1H  /                                       FTNX1   00047
C                                                                       PRECOF  00008
C         THIS SUBROUTINE PRINTS THE COEFFICIENTS USED IN THE           PRECOF  00009
C         POLYNOMIAL EQUATION USED IN CALCULATION OF MODE SHAPES        PRECOF  00010
C                                                                       PRECOF  00011
C         IDEG - DEGREE OF POLYNOMIAL EQUATION                          PRECOF  00012
C         A    - ARRAY OF COEFFICIENTS                                  PRECOF  00013
C         IFR  - FLAG INDICATING HOW COEFFICIENTS ARE OBTAINED          PRECOF  00014
C                =1, READ FROM CARDS                                    PRECOF  00015
C                =2, FROM LEAST SQUARES SURFACE FIT                     PRECOF  00016
C                                                                       PRECOF  00017
      IF(IFR.EQ.1) WRITE(NT6,9055) A(1)                                 PRECOF  00018
      IF(IFR.EQ.2) WRITE(NT6,9065) A(1)                                 PRECOF  00019
C                                                                       PRECOF  00020
      IF(IDEG.EQ.0) GO TO 550                                           PRECOF  00021
      IDEX = 2                                                          PRECOF  00022
      DO 520 I=1,IDEG                                                   PRECOF  00023
      NCL = I+1                                                         PRECOF  00024
      LDEX = IDEX + I                                                   PRECOF  00025
      DO 541 NXP=1,NCL                                                  PRECOF  00026
      IXP(NXP) = NCL-NXP                                                PRECOF  00027
      IYP(NXP) = NXP-1                                                  PRECOF  00028
  541 CONTINUE                                                          PRECOF  00029
      WRITE(NT6,9060) (BLNK(NXP),IXP(NXP),IYP(NXP),NXP=1,NCL)           PRECOF  00030
      WRITE(NT6,9061) (BNK2(NXP),NXP=1,NCL)                             PRECOF  00031
      WRITE(NT6,9062) (A(J),J=IDEX,LDEX)                                PRECOF  00032
      IDEX = LDEX + 1                                                   PRECOF  00033
  520 CONTINUE                                                          PRECOF  00034
  550 CONTINUE                                                          PRECOF  00035
      RETURN                                                            PRECOF  00036
 9055 FORMAT(13X,*MODAL POLYNOMIAL COEFFICIENTS* 20X,*FROM CARD INPUT*  PRECOF  00037
     1 /13X,29(1H-) /*0 CONSTANT* /2X,10(1H-) / E12.4 )                 PRECOF  00038
 9060 FORMAT(1HO,6(A1,4HX ** I1,4HY ** I1,3X) )                         PRECOF  00039
 9061 FORMAT(1X,6(A1,10H----------,3X) )                                PRECOF  00040
 9062 FORMAT(E12.4,5E14.4)                                              PRECOF  00041
 9065 FORMAT(1HO,12X,*MODAL POLYNOMIAL COEFFICIENTS*/13X,*BY LEAST SQUAR PRECOF  00042
     1ES SURFACE FIT*/13X,29(1H-)//*0  CONSTANT*/2X,10(1H-)/ E12.4 )    PRECOF  00043
      END                                                               PRECOF  00044
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      ITYPE = 5HMIXED                                                   VICMAIN 00095
      MXARRY = 6HATAB                                                   VICMAIN 00096
      CALL READMX(NSPAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR,500,NID,ID,ITYPE, VICMAIN 00097
     1            LRS, ATAB,M,N,PARM,IRR)                               VICMAIN 00098
      IF(IRR.NE.0) GO TO 6060                                           VICMAIN 00099
      REWIND NSPAIC                                                     VICMAIN 00100
C                                                                       VICMAIN 00101
      IF(NV.NE.1) GO TO 555                                             VICMAIN 00102
C                                                                       VICMAIN 00103
C         PRINT THE TABLE OF CONTENTS                                   VICMAIN 00104
      WRITE (NT6,9215)                                                  VICMAIN 00105
 9215 FORMAT(1H1,14X,*SPATIAL AIC TAPE TABLE OF CONTENTS* /15X,34(1H-), VICMAIN 00106
     1   // 5X,*NO.* 4X,*MACH* 6X,*K1-VALUE* 6X,*ERROR* 4X,*SIZE*,5X,   VICMAIN 00107
     2     *YBAR* 5X,*ZBAR* / )                                         VICMAIN 00108
      NDELT = 0                                                         VICMAIN 00109
      DO 550 I=1,NKST                                                   VICMAIN 00110
      IF(AMACH(I).GT.0) GO TO 525                                       VICMAIN 00111
      NDELT = NDELT +1                                                  VICMAIN 00112
      GO TO 550                                                         VICMAIN 00113
  525 WRITE (NT6,9020) I, AMACH(I),AKVAL(I),AERR(I),ISIZE(I),YBARS(I),  VICMAIN 00114
     1               VERTS(I)                                           VICMAIN 00115
  550 CONTINUE                                                          VICMAIN 00116
      WRITE (NT6,9025) NDELT                                            VICMAIN 00117
C                                                                       VICMAIN 00118
C         SEARCH FOR MATRICES WITH CORRECT K-VALUE, MACH, ERROR, SIZE,  VICMAIN 00119
C         AND YBAR.                                                     VICMAIN 00120
C                                                                       VICMAIN 00121
  555 CONTINUE                                                          VICMAIN 00122
      IVAL = 0                                                          VICMAIN 00123
      NSIZ = 0                                                          VICMAIN 00124
      DO 600 I=1,NKST                                                   VICMAIN 00125
      IF(ABS(AMACH(I)-XMACH).GT.1.0E-05) GO TO 600                      VICMAIN 00126
      IF(ABS(AKVAL(I)-K1   ).GT.1.0E-07) GO TO 600                      VICMAIN 00127
      IF(AERR(I).GT.ERR) GO TO 600                                      VICMAIN 00128
      IF(ABS(VERTS(I)-EL).GT.1.0E-04) GO TO 600                         VICMAIN 00129
      IF(ABS(YBAR-YBARS(I) ).GT.1.0E-04) GO TO 600                      VICMAIN 00130
C                                                                       VICMAIN 00131
C         THERE IS A GOOD MATRIX ON TAPE. DETERMINE IF SIZE IS ADEQUATE VICMAIN 00132
C                                                                       VICMAIN 00133
      IF(IVAL.NE.0) GO TO 575                                           VICMAIN 00134
      IF(NROWS.GT.ISIZE(I)+10.AND.ERR.GT.AERR(I)) GO TO 600             VICMAIN 00135
      IVAL = I                                                          VICMAIN 00136
      NSIZ = ISIZE(I)                                                   VICMAIN 00137
  575 CONTINUE                                                          VICMAIN 00138
      IF(ISIZE(I).GE.NROWS) GO TO 600                                   VICMAIN 00139
C                                                                       VICMAIN 00140
C         THE SIZE IS NOT LARGE ENOUGH. SEE IF THIS IS LARGER THAN ANY  VICMAIN 00141
C         PREVIOUS MATRIX.                                              VICMAIN 00142
C                                                                       VICMAIN 00143
      IF(ISIZE(I).LE.NSIZ) GO TO 600                                    VICMAIN 00144
      IF(NROWS.GT.ISIZE(I)+10.AND.ERR.GT.AERR(I)) GO TO 600             VICMAIN 00145
      IVAL = I                                                          VICMAIN 00146
      NSIZ = ISIZE(I)                                                   VICMAIN 00147
  600 CONTINUE                                                          VICMAIN 00148
C                                                                       VICMAIN 00149
C         DETERMINE IF THERE WAS A MATRIX ON TAPE THAT COULD BE ENLARGED VICMAIN 00150
      IF(IVAL.EQ.0) GO TO 25                                            VICMAIN 00151
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C                                                                       VICMAIN 00038
C         CALCULATE 2 PLANAR AICS IF SUBDIVISION IS APPLIED.            VICMAIN 00039
      NPK = 1                                                           VICMAIN 00040
      IF(NSUBDV.GT.1) NPK = 2                                           VICMAIN 00041
      NVCS = NSPATK + NPK                                               VICMAIN 00042
      DO 1000 NV = 1,NVCS                                               VICMAIN 00043
C                                                                       VICMAIN 00044
C         SET K1 VALUE IF SUBDIVIDED AIC                                VICMAIN 00045
C                                                                       VICMAIN 00046
      IF(NPK.EQ.2.AND.NV.EQ.NVCS) K1= K1/FLOAT(NSUBDV)                  VICMAIN 00047
C                                                                       VICMAIN 00048
      LENZ = LKERNL                                                     VICMAIN 00049
      IF(NV.EQ.NVCS.AND.NPK.EQ.2) LENZ = LSKERN                         VICMAIN 00050
      DO 100 I=1,LENZ                                                   VICMAIN 00051
      C(I) = (0.,0.)                                                    VICMAIN 00052
      W(I) = (0.,0.)                                                    VICMAIN 00053
      V(I) = (0.,0.)                                                    VICMAIN 00054
  100 CONTINUE                                                          VICMAIN 00055
C                                                                       VICMAIN 00056
  110 CONTINUE                                                          VICMAIN 00057
      IF(NV.GT.NVCS-NPK) GO TO 10                                       VICMAIN 00058
C                                                                       VICMAIN 00059
C         READ MUAIC ARRAY FROM IGEOSC. FIRST FILE MUST BE SKIPPED      VICMAIN 00060
C         PRIOR TO FIRST READ.                                          VICMAIN 00061
C                                                                       VICMAIN 00062
      CALL RDINIT                                                       VICMAIN 00063
      IF(NV.NE.1) GO TO 200                                             VICMAIN 00064
      REWIND IGEOSC                                                     VICMAIN 00065
      NFS = 1                                                           VICMAIN 00066
  200 CONTINUE                                                          VICMAIN 00067
      ITYPE = 5HMIXED                                                   VICMAIN 00068
      MXARRY = 6HMUAIC                                                  VICMAIN 00069
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,   VICMAIN 00070
     1            LRS,MUAIC,M,NROWS,PARM,IRR)                           VICMAIN 00071
      IF(IRR.NE.0) GO TO 6010                                           VICMAIN 00072
C                                                                       VICMAIN 00073
      YBAR = PARM(4)                                                    VICMAIN 00074
      EL = PARM(5)                                                      VICMAIN 00075
      NN = 1                                                            VICMAIN 00076
C                                                                       VICMAIN 00077
C         DETERMINE IF SPATIAL AICS ARE ON TAPE AND GET THEM            VICMAIN 00078
C         IF POSSIBLE.                                                  VICMAIN 00079
C                                                                       VICMAIN 00080
      NKST = 0                                                          VICMAIN 00081
      IF(.NOT.OSPAIC) GO TO 25                                          VICMAIN 00082
C                                                                       VICMAIN 00083
C         AICS ARE ON TAPE. GET TABLE OF CONTENTS.                      VICMAIN 00084
      REWIND NSPAIC                                                     VICMAIN 00085
      CALL RDINIT                                                       VICMAIN 00086
      NFS = 1                                                           VICMAIN 00087
      ITYPE = 5HMIXED                                                   VICMAIN 00088
      MXARRY = 6HTAB                                                    VICMAIN 00089
      CALL READMX(NSPAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR,500,NID,ID,ITYPE, VICMAIN 00090
     1            LRS,  TAB,NKST,N,PARM,IRR)                            VICMAIN 00091
      IF(IRR.NE.0) GO TO 6060                                           VICMAIN 00092
C                                                                       VICMAIN 00093
      CALL RDINIT                                                       VICMAIN 00094
```

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C                                                                       VICMAIN 00038
C         CALCULATE 2 PLANAR AICS IF SUBDIVISION IS APPLIED.            VICMAIN 00039
      NPK = 1                                                           VICMAIN 00040
      IF(NSUBDV.GT.1) NPK = 2                                           VICMAIN 00041
      NVCS = NSPATK + NPK                                               VICMAIN 00042
      DO 1000 NV = 1,NVCS                                               VICMAIN 00043
C                                                                       VICMAIN 00044
C         SET K1 VALUE IF SUBDIVIDED AIC                                VICMAIN 00045
C                                                                       VICMAIN 00046
      IF(NPK.EQ.2.AND.NV.EQ.NVCS) K1= K1/FLOAT(NSUBDV)                  VICMAIN 00047
C                                                                       VICMAIN 00048
      LENZ = LKERNL                                                     VICMAIN 00049
      IF(NV.EQ.NVCS.AND.NPK.EQ.2) LENZ = LSKERN                         VICMAIN 00050
      DO 100 I=1,LENZ                                                   VICMAIN 00051
      C(I) = (0.,0.)                                                    VICMAIN 00052
      W(I) = (0.,0.)                                                    VICMAIN 00053
      V(I) = (0.,0.)                                                    VICMAIN 00054
  100 CONTINUE                                                          VICMAIN 00055
C                                                                       VICMAIN 00056
  110 CONTINUE                                                          VICMAIN 00057
      IF(NV.GT.NVCS-NPK) GO TO 10                                       VICMAIN 00058
C                                                                       VICMAIN 00059
C         READ MUAIC ARRAY FROM IGEOSC. FIRST FILE MUST BE SKIPPED      VICMAIN 00060
C         PRIOR TO FIRST READ.                                          VICMAIN 00061
C                                                                       VICMAIN 00062
      CALL RDINIT                                                       VICMAIN 00063
      IF(NV.NE.1) GO TO 200                                             VICMAIN 00064
      REWIND IGEOSC                                                     VICMAIN 00065
      NFS = 1                                                           VICMAIN 00066
  200 CONTINUE                                                          VICMAIN 00067
      ITYPE = 5HMIXED                                                   VICMAIN 00068
      MXARRY = 6HMUAIC                                                  VICMAIN 00069
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,  VICMAIN 00070
     1            LRS,MUAIC,M,NROWS,PARM,IRR)                           VICMAIN 00071
      IF(IRR.NE.0) GO TO 6010                                           VICMAIN 00072
C                                                                       VICMAIN 00073
      YBAR = PARM(4)                                                    VICMAIN 00074
      EL = PARM(5)                                                      VICMAIN 00075
      NN = 1                                                            VICMAIN 00076
C                                                                       VICMAIN 00077
C         DETERMINE IF SPATIAL AICS ARE ON TAPE AND GET THEM            VICMAIN 00078
C         IF POSSIBLE.                                                  VICMAIN 00079
C                                                                       VICMAIN 00080
      NKST = 0                                                          VICMAIN 00081
      IF(.NOT.OSPAIC) GO TO 25                                          VICMAIN 00082
C                                                                       VICMAIN 00083
C         AICS ARE ON TAPE. GET TABLE OF CONTENTS.                      VICMAIN 00084
      REWIND NSPAIC                                                     VICMAIN 00085
      CALL RDINIT                                                       VICMAIN 00086
      NFS = 1                                                           VICMAIN 00087
      ITYPE = 5HMIXED                                                   VICMAIN 00088
      MXARRY = 6HTAB                                                    VICMAIN 00089
      CALL READMX(NSPAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR,500,NID,ID,ITYPE, VICMAIN 00090
     1            LRS,  TAB,NKST,N,PARM,IRR)                            VICMAIN 00091
      IF(IRR.NE.0) GO TO 6060                                           VICMAIN 00092
C                                                                       VICMAIN 00093
      CALL RDINIT                                                       VICMAIN 00094
```

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C                                                                       VICMAIN 00152
C         THERE IS A MATRIX THAT CAN BE ENLARGED.                       VICMAIN 00153
      AMACH(IVAL) = -AMACH(IVAL)                                        VICMAIN 00154
      WRITE (NT6,9030) IVAL, AERR(IVAL),ISIZE(IVAL),NROWS               VICMAIN 00155
C                                                                       VICMAIN 00156
C         SPACE TO CORRECT ARRAY ON TAPE                                VICMAIN 00157
      CALL RDINIT                                                       VICMAIN 00158
      NMS = (IVAL-1)*4                                                  VICMAIN 00159
      ITYPE = 5HMIXED                                                   VICMAIN 00160
      MXARRY = 6HMUTWO                                                  VICMAIN 00161
      CALL READMX(NSPAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR, 2 ,NID,ID,ITYPE, VICMAIN 00162
     1            LRS,MUTWO,M,N,PARM,IRR)                               VICMAIN 00163
      IF(IRR.NE.0) GO TO 6060                                           VICMAIN 00164
C                                                                       VICMAIN 00165
      CALL RDINIT                                                       VICMAIN 00166
      ITYPE = 5HMIXED                                                   VICMAIN 00167
      MXARRY = 6H C                                                     VICMAIN 00168
      CALL READMX(NSPAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,   VICMAIN 00169
     1            LRS, C, M,N,PARM,IRR)                                 VICMAIN 00170
      IF(IRR.NE.0) GO TO 6060                                           VICMAIN 00171
C                                                                       VICMAIN 00172
      CALL RDINIT                                                       VICMAIN 00173
      ITYPE = 5HMIXED                                                   VICMAIN 00174
      MXARRY = 6H W                                                     VICMAIN 00175
      CALL READMX(NSPAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,   VICMAIN 00176
     1            LRS, W, M,N,PARM,IRR)                                 VICMAIN 00177
      IF(IRR.NE.0) GO TO 6060                                           VICMAIN 00178
C                                                                       VICMAIN 00179
      CALL RDINIT                                                       VICMAIN 00180
      ITYPE = 5HMIXED                                                   VICMAIN 00181
      MXARRY = 6H V                                                     VICMAIN 00182
      CALL READMX(NSPAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,   VICMAIN 00183
     1            LRS, V, M,N,PARM,IRR)                                 VICMAIN 00184
      IF(IRR.NE.0) GO TO 6060                                           VICMAIN 00185
C                                                                       VICMAIN 00186
      GO TO 25                                                          VICMAIN 00187
  800 CONTINUE                                                          VICMAIN 00188
C                                                                       VICMAIN 00189
C         THERE IS A GOOD MATRIX ON TAPE. READ THE TAPE, PRINT MESSAGE, VICMAIN 00190
C         MAIL RESUME ON THIS ONE ANYWAY.                               VICMAIN 00191
C                                                                       VICMAIN 00192
C         SET NSIZ  EQUAL TO NROWS SO THAT MATRIX WILL NOT BE WRITTEN   VICMAIN 00193
C         ON TAPE                                                       VICMAIN 00194
C                                                                       VICMAIN 00195
      NSIZ = NROWS                                                      VICMAIN 00196
      CALL RDINIT                                                       VICMAIN 00197
      NMS = (I-1)*4                                                     VICMAIN 00198
      ITYPE = 5HMIXED                                                   VICMAIN 00199
      MXARRY = 6HMUTWO                                                  VICMAIN 00200
      CALL READMX(NSPAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2, NID,ID,ITYPE,  VICMAIN 00201
     1            LRS,MUTWO,M,N,PARM,IRR)                               VICMAIN 00202
      IF(IRR.NE.0) GO TO 6060                                           VICMAIN 00203
C                                                                       VICMAIN 00204
      CALL RDINIT                                                       VICMAIN 00205
      ITYPE = 5HMIXED                                                   VICMAIN 00206
      MXARRY = 6H C                                                     VICMAIN 00207
      CALL READMX(NSPAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,   VICMAIN 00208
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     1            LRS,C,M,N, PARM,IRR)                                    VICMAIN 00209
      IF(IRR.NE.0) GO TO 6060                                             VICMAIN 00210
C                                                                         VICMAIN 00211
      CALL RDINIT                                                         VICMAIN 00212
      ITYPE = SHMIXED                                                     VICMAIN 00213
      MXARRY = 6H W                                                       VICMAIN 00214
      CALL  READMX(NSPAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,    VICMAIN 00215
     1            LRS,W,M,N, PARM,IRR)                                    VICMAIN 00216
      IF(IRR.NE.0) GO TO 6060                                             VICMAIN 00217
C                                                                         VICMAIN 00218
      CALL RDINIT                                                         VICMAIN 00219
      ITYPE = SHMIXED                                                     VICMAIN 00220
      MXARRY = 6H V                                                       VICMAIN 00221
      CALL READMX(NSPAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,     VICMAIN 00222
     1            LRS,V,M,N, PARM, IRR)                                   VICMAIN 00223
      IF(IRR.NE.0) GO TO 6060                                             VICMAIN 00224
      WRITE (NT6,6005) I, AERR(I)                                         VICMAIN 00225
      GO TO 25                                                            VICMAIN 00226
   10 CONTINUE                                                            VICMAIN 00227
      YBAR = 0.0                                                          VICMAIN 00228
      EL = 0.0                                                            VICMAIN 00229
C                                                                         VICMAIN 00230
C         DETERMINE THE SIZE AND LOCATIONS OF THE PLANAR AIC ARRAYS.      VICMAIN 00231
C         THE UNSUBDIVIDED WILL BE CALCULATED FIRST AND STORED IN         VICMAIN 00232
C         THE PROPER PLACE IN BLANK COMMON.                               VICMAIN 00233
C         THE SUBDIVIDED WILL BE CALCULATED SECOND, OVERLAYING SOME OF    VICMAIN 00234
C         THE UNSUBDIVIDED NUMBERS.                                       VICMAIN 00235
C                                                                         VICMAIN 00236
C         LSKERN = SIZE OF UNSUBDIVIDED OR SUBDIVIDED ARRAY ALONE.        VICMAIN 00237
C         ISUB   = NUMBER OF ROWS ON UNSUBDIVIDED AIC THAT SUBDIVIDED     VICMAIN 00238
C                  AIC ARRAY WILL OVERLAY                                 VICMAIN 00239
C         LTOBKN = NUMBER OF BOXES OF UNSUBDIVIDED AIC THAT WILL BE       VICMAIN 00240
C                  OVERLAID                                               VICMAIN 00241
C         IPKERN = SUBSCRIPT OF WHERE FIRST BOX OF UNSUBDIVIDED BOX       VICMAIN 00242
C                  WOULD BE IF IT WERE NOT OVERLAID. THIS ALLOWS          VICMAIN 00243
C                  PROGRAM TO REFERENCE UNSUBDIVIDED ARRAY WITH PROPER    VICMAIN 00244
C                  SUBSCRIPT.                                             VICMAIN 00245
C         MAXL   = LENGTH OF COMPUTED AIC ARRAY                           VICMAIN 00246
C                                                                         VICMAIN 00247
      XNA = NPLKRN                                                        VICMAIN 00248
      LUKERN = (XNA/2.) * (XNA + 1.) + .001                               VICMAIN 00249
      MXSKRN = NPLKRN                                                     VICMAIN 00250
      IST = 0                                                             VICMAIN 00251
      IF(NSUBDV.EQ.1) GO TO 340                                           VICMAIN 00252
C                                                                         VICMAIN 00253
C         IF THE EFFECTIVE AREA WAS INPUT ON CARDC USE THAT               VICMAIN 00254
C         FIND IF THE PLANFORM LIMITS THE SIZE OF THE EFFECTIVE AREA.     VICMAIN 00255
C                                                                         VICMAIN 00256
      IF(NROWEA.GT.20) NROWEA = 20                                        VICMAIN 00257
      IF(NROWEA.NE.0) MXSKRN = NSUBDV * NROWEA                            VICMAIN 00258
C                                                                         VICMAIN 00259
C                                                                         VICMAIN 00260
      NBOXES = MYBBSW                                                     VICMAIN 00261
      NBROW  = 1                                                          VICMAIN 00262
      NBOXRW = (MYBBSW-1)*2                                               VICMAIN 00263
  300 CONTINUE                                                            VICMAIN 00264
      IF(NBOXES .GT. LSDW) GO TO 323                                      VICMAIN 00265
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      NBOXES = NBOXES + NBOXRW                                          VICMAIN 00266
      NBOXRW = NBOXRW - 2                                               VICMAIN 00267
      IF(NBOXRW.LE.0) GO TO 330                                         VICMAIN 00268
      NSROW  = NSROW  + 2                                               VICMAIN 00269
      GO TO 300                                                         VICMAIN 00270
  325 CONTINUE                                                          VICMAIN 00271
      NSROW = NSROW - 1                                                 VICMAIN 00272
      IF (NBOXES-NBOXRW/2 .GT. LSDW) NSROW = NSROW - 1                  VICMAIN 00273
      GO TO 335                                                         VICMAIN 00274
  330 CONTINUE                                                          VICMAIN 00275
      NSROW = MXSKRN                                                    VICMAIN 00276
  335 CONTINUE                                                          VICMAIN 00277
      XNA = MXSKRN                                                      VICMAIN 00278
      LSKERN = XNA*(XNA/2.) + (XNA/2.) + 0.001                          VICMAIN 00279
      ISUB = MXSKRN/NSUBDV                                              VICMAIN 00280
      IF (NSROW .LT. MXSKRN) ISUB =  NSROW/NSUBDV                       VICMAIN 00281
      SUB    = ISUB                                                     VICMAIN 00282
      LTOBKN = SUB*(SUB/2.) + (SUB/2.) + 0.001                          VICMAIN 00283
      IST    = LSKERN - LTOBKN                                          VICMAIN 00284
  340 CONTINUE                                                          VICMAIN 00285
      IPKERN = IST + 1                                                  VICMAIN 00286
      MAXL = IST + LUKERN                                               VICMAIN 00287
      IF(MAXL.LE.LKERNL) GO TO 21                                       VICMAIN 00288
      WRITE (NT6,9305) MAXL,LKERNL                                      VICMAIN 00289
 9305 FORMAT(59HO*** ERROR - THE SIZE OF THE AIC ARRAY FOR THIS PLANFORM VICMAIN 00290
     1 IS,I5,29H, THE MAXIMUM SIZE ALLOWED IS,I5, 5H. *** )             VICMAIN 00291
      CALL FLUSH(1)                                                     VICMAIN 00292
C                                                                       VICMAIN 00293
   21 CONTINUE                                                          VICMAIN 00294
C                                                                       VICMAIN 00295
      IF(NPK.EQ.2.AND.NV.EQ.NVCS-1) GO TO 22                            VICMAIN 00296
      NN = 1                                                            VICMAIN 00297
      NROWS = MXSKRN                                                    VICMAIN 00298
      GO TO 23                                                          VICMAIN 00299
   22 CONTINUE                                                          VICMAIN 00300
      NN = IPKERN                                                       VICMAIN 00301
      NROWS = NPLKRN                                                    VICMAIN 00302
   23 CONTINUE                                                          VICMAIN 00303
      DO 24 I=1,NROWS                                                   VICMAIN 00304
      MAIC(1,I) = I                                                     VICMAIN 00305
      MAIC(2,I) = I + I - 1                                             VICMAIN 00306
   24 CONTINUE                                                          VICMAIN 00307
C                                                                       VICMAIN 00308
C                                                                       VICMAIN 00309
C        DETERMINE IF KERNELS EXIST ON TAPE AND GET THEM FROM TAPE      VICMAIN 00310
C        IF POSSIBLE.                                                   VICMAIN 00311
C                                                                       VICMAIN 00312
      NKOT = 0                                                          VICMAIN 00313
      IF(.NOT.OPLAIC) GO TO 25                                          VICMAIN 00314
C                                                                       VICMAIN 00315
C        KERNELS ARE ON TAPE. GET TABLE OF CONTENTS                     VICMAIN 00316
      REWIND NPLAIC                                                     VICMAIN 00317
      CALL RDINIT                                                       VICMAIN 00318
      NFS = 1                                                           VICMAIN 00319
      ITYPE = 5HMIXED                                                   VICMAIN 00320
      MXARRY = 6HTAR                                                    VICMAIN 00321
      CALL READMX(NPLAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR,500,NID,ID,ITYPE, VICMAIN 00322
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     2  31X,1HC,34X,1HW,34X,1HV,/3X,2HNU,3X,2HMU,7X,*VELOCITY POTENTIAL  VICMAIN 00437
     3COEFFICIENT* 10X,*UPWASH COEFFICIENT*,15X,*SIDEWASH COEFFICIENT* / VICMAIN 00438
     4 2(3X,2H--),7X, 32(1H-),2X,32(1H-),2X,32(1H-) //)                 VICMAIN 00439
C                                                                       VICMAIN 00440
      IF(.NOT.PRNT) GO TO 52                                            VICMAIN 00441
      K=0                                                               VICMAIN 00442
      KN = 0                                                            VICMAIN 00443
      IF(NPK.EQ.2.AND.NV.EQ.NVCS-1) KN = IPKERN -1                      VICMAIN 00444
C                                                                       VICMAIN 00445
      DO 50 I=1,NROWS                                                   VICMAIN 00446
      M= I-1                                                            VICMAIN 00447
      MH = M/2                                                          VICMAIN 00448
      JS = 2*(I-1) +1                                                   VICMAIN 00449
      IF(YBAR.NE.0.0) JS = JS+1                                         VICMAIN 00450
      IF(EL.EQ.0.0) JS = I                                              VICMAIN 00451
      DO 50 J=1,JS                                                      VICMAIN 00452
      K=K+1                                                             VICMAIN 00453
      KN = KN + 1                                                       VICMAIN 00454
      N = I - J                                                         VICMAIN 00455
      IF(EL.EQ.0.0) N = 1- J                                            VICMAIN 00456
      IF(YBAR.LT.0.0) N = -N                                            VICMAIN 00457
      WRITE (NT6,9210) M,N,C(KN),W(K),V(K)                              VICMAIN 00458
 9210 FORMAT(2I5,5X,6E17.8)                                             VICMAIN 00459
   50 CONTINUE                                                          VICMAIN 00460
      GO TO 53                                                          VICMAIN 00461
C                                                                       VICMAIN 00462
   52 CONTINUE                                                          VICMAIN 00463
      RN = NROWS                                                        VICMAIN 00464
      K = RN* (RN/2.) + (RN/2.) + 1.0E-05                               VICMAIN 00465
      IF(EL.EQ.0.) GO TO 53                                             VICMAIN 00466
      K = K+K                                                           VICMAIN 00467
      IF(YBAR.EQ.0.)  K = K - NROWS                                     VICMAIN 00468
   53 CONTINUE                                                          VICMAIN 00469
C                                                                       VICMAIN 00470
C                                                                       VICMAIN 00471
      IF (NSPATK .EQ. 0 .OR. NV .GT. NVCS-NPK) GO TO 55                 VICMAIN 00472
      IF(NV.EQ.1) REWIND IAICSC                                         VICMAIN 00473
C                                                                       VICMAIN 00474
C         WRITE THE SPATIAL AICS ON A SCRATCH FILE                      VICMAIN 00475
C                                                                       VICMAIN 00476
      CALL RDINIT                                                       VICMAIN 00477
      PARM(1) = K1                                                      VICMAIN 00478
      PARM(2) = XMACH                                                   VICMAIN 00479
      PARM(4) = YBAR                                                    VICMAIN 00480
      PARM(5) = EL                                                      VICMAIN 00481
      ITYPE = 5HMIXED                                                   VICMAIN 00482
      MXARRY = 6HMUAIC                                                  VICMAIN 00483
      CALL WRTEMX(IAICSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,2,ID,         VICMAIN 00484
     1            MUAIC,ITYPE,2,NROWS,PARM,IRR)                         VICMAIN 00485
      IF(IRR.NE.0) GO TO 6170                                           VICMAIN 00486
C                                                                       VICMAIN 00487
      MXARRY = 6H C                                                     VICMAIN 00488
      CALL WRTEMX(IAICSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,2,ID,         VICMAIN 00489
     1            C,     ITYPE, 2,K,     PARM, IRR)                     VICMAIN 00490
      IF(IRR.NE.0) GO TO 6170                                           VICMAIN 00491
C                                                                       VICMAIN 00492
      MXARRY = 3H W                                                     VICMAIN 00493
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      AMACH(IVAL) = -AMACH(IVAL)                                        VICMAIN 00380
      WRITE (NT6,9030) IVAL, AERR(IVAL),ISIZE(IVAL),NPLKRN              VICMAIN 00381
 9030 FORMAT(46HOTHE PROGRAM IS GOING TO ENLARGE AIC ARRAY NO. I3,      VICMAIN 00382
     1   29H, GENERATED AT AN ACCURACY OF F8.5 /19H IT IS NECESSARY TO  VICMAIN 00383
     2   29H ENLARGE THE SAVED ARRAY FROM I3, 3H TO, I3 )               VICMAIN 00384
C                                                                       VICMAIN 00385
C         SPACE TO CORRECT ARRAY ON TAPE                                VICMAIN 00386
      REWIND NPLAIC                                                     VICMAIN 00387
      CALL RDINIT                                                       VICMAIN 00388
      NMS = IVAL-1                                                      VICMAIN 00389
      ITYPE = 5HMIXED                                                   VICMAIN 00390
      MXARRY = 6H C                                                     VICMAIN 00391
      CALL READMX(NPLAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,   VICMAIN 00392
     1           LRS,C(NN), M, N, PARM, IRR)                            VICMAIN 00393
      IF(IRR.NE.0) GO TO 6050                                           VICMAIN 00394
C                                                                       VICMAIN 00395
C         SET MUAIC ARRAY FOR EXPANSION AIC CALCULATION                 VICMAIN 00396
      DO 1700 I=1,NSIZE                                                 VICMAIN 00397
      MUAIC(1,I) = 0                                                    VICMAIN 00398
      MUAIC(2,I) = 0                                                    VICMAIN 00399
 1700 CONTINUE                                                          VICMAIN 00400
      GO TO 25                                                          VICMAIN 00401
 1800 CONTINUE                                                          VICMAIN 00402
C                                                                       VICMAIN 00403
C         THERE IS A GOOD MATRIX ON TAPE. READ THE TAPE, PRINT MESSAGE, VICMAIN 00404
C         DO NOT MAIL RESUME.                                           VICMAIN 00405
C         SET NSIZE EQUAL TO NPLKRN SO THAT MATRIX WILL NOT BE WRITTEN  VICMAIN 00406
C         ON TAPE.                                                      VICMAIN 00407
C                                                                       VICMAIN 00408
      NSIZE = NPLKRN                                                    VICMAIN 00409
      CALL RDINIT                                                       VICMAIN 00410
      REWIND NPLAIC                                                     VICMAIN 00411
      NMS = I-1                                                         VICMAIN 00412
      ITYPE = 5HMIXED                                                   VICMAIN 00413
      MXARRY = 6H C                                                     VICMAIN 00414
      CALL READMX(NPLAIC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,  NID,ID,ITYPE, VICMAIN 00415
     1           LRS,C(NN), M, N, PARM, IRR)                            VICMAIN 00416
      IF(IRR.NE.0) GO TO 6050                                           VICMAIN 00417
C                                                                       VICMAIN 00418
      WRITE (NT6,6005) I, AERR(I)                                       VICMAIN 00419
      GO TO 35                                                          VICMAIN 00420
   25 CONTINUE                                                          VICMAIN 00421
C                                                                       VICMAIN 00422
      CALL KERNEL(XMACH,K1,ERR,C(NN),W,V)                               VICMAIN 00423
C                                                                       VICMAIN 00424
   35 CONTINUE                                                          VICMAIN 00425
      PRNT = .FALSE.                                                    VICMAIN 00426
      IF (NV.GT.NVCS-NPK) GO TO 40                                      VICMAIN 00427
      IF(PRSAIC) PRNT = .TRUE.                                          VICMAIN 00428
      GO TO 45                                                          VICMAIN 00429
   40 CONTINUE                                                          VICMAIN 00430
      IF(PRPAIC) PRNT = .TRUE.                                          VICMAIN 00431
   45 CONTINUE                                                          VICMAIN 00432
      IF (.NOT.PRNT) WRITE (NT6,9005) TITLE,XMACH,K1,ERR,EL,YBAR        VICMAIN 00433
 9005 FORMAT(1H1, 8A10, // 40X, *AIC CALCULATIONS*, ///                  VICMAIN 00434
     X       17X, *MACH =*, F10.5, 5X,  *K1 =*,                         VICMAIN 00435
     1  F10.7,5X,*ERR =*,E12.5,5X,*EL =*, F6.2,5X,*YBAR =*,F6.2,//      VICMAIN 00436
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     2  31X,1HC,34X,1HW,34X,1HV,/3X,2HNU,3X,2HMU,7X,*VELOCITY POTENTIAL  VICMAIN 00437
     3COEFFICIENT* 10X,*UPWASH COEFFICIENT*,15X,*SIDEWASH COEFFICIENT* / VICMAIN 00438
     4 2(3X,2H--),7X, 32(1H-),2X,32(1H-),2X,32(1H-) //)                 VICMAIN 00439
C                                                                       VICMAIN 00440
      IF(.NOT.PRNT) GO TO 52                                            VICMAIN 00441
      K=0                                                               VICMAIN 00442
      KN = 0                                                            VICMAIN 00443
      IF(NPK.EQ.2.AND.NV.EQ.NVCS-1) KN = IPKERN -1                      VICMAIN 00444
C                                                                       VICMAIN 00445
      DO 50 I=1,NROWS                                                   VICMAIN 00446
      M= I-1                                                            VICMAIN 00447
      MM = M/2                                                          VICMAIN 00448
      JS = 2*(I-1) +1                                                   VICMAIN 00449
      IF(YBAR.NE.0.0) JS = JS+1                                         VICMAIN 00450
      IF(EL.EQ.0.0) JS = I                                              VICMAIN 00451
      DO 50 J=1,JS                                                      VICMAIN 00452
      K=K+1                                                             VICMAIN 00453
      KN = KN + 1                                                       VICMAIN 00454
      N = I - J                                                         VICMAIN 00455
      IF(EL.EQ.0.0) N = 1- J                                            VICMAIN 00456
      IF(YBAR.LT.0.0) N = -N                                            VICMAIN 00457
      WRITE (NT6,9210) M,N,C(KN),W(K),V(K)                              VICMAIN 00458
 9210 FORMAT(2I5,5X,6E17.8)                                             VICMAIN 00459
   50 CONTINUE                                                          VICMAIN 00460
      GO TO 53                                                          VICMAIN 00461
C                                                                       VICMAIN 00462
   52 CONTINUE                                                          VICMAIN 00463
      RN = NROWS                                                        VICMAIN 00464
      K = RN* (RN/2.) + (RN/2.) + 1.0E-05                               VICMAIN 00465
      IF(EL.EQ.0.) GO TO 53                                             VICMAIN 00466
      K = K+K                                                           VICMAIN 00467
      IF(YBAR.EQ.0.)  K = K - NROWS                                     VICMAIN 00468
   53 CONTINUE                                                          VICMAIN 00469
C                                                                       VICMAIN 00470
C                                                                       VICMAIN 00471
      IF (NSPATK .EQ. 0 .OR. NV .GT. NVCS-NPK) GO TO 55                 VICMAIN 00472
      IF(NV.EQ.1) REWIND IAICSC                                         VICMAIN 00473
C                                                                       VICMAIN 00474
C        WRITE THE SPATIAL AICS ON A SCRATCH FILE                       VICMAIN 00475
C                                                                       VICMAIN 00476
      CALL RDINIT                                                       VICMAIN 00477
      PARM(1) = K1                                                      VICMAIN 00478
      PARM(2) = XMACH                                                   VICMAIN 00479
      PARM(4) = YBAR                                                    VICMAIN 00480
      PARM(5) = EL                                                      VICMAIN 00481
      ITYPE = SHMIXED                                                   VICMAIN 00482
      MXARRY = 6HMAIC                                                   VICMAIN 00483
      CALL WRTEMX(IAICSC,MXWRIT,RANDOU,NFS,NWS,LS,NWR,LWS,2,ID,         VICMAIN 00484
     1            MAIC,ITYPE,2,NROWS,PARM,IRR)                          VICMAIN 00485
      IF(IRR.NE.0) GO TO 6170                                           VICMAIN 00486
C                                                                       VICMAIN 00487
      MXARRY = 6H C                                                     VICMAIN 00488
      CALL WRTEMX(IAICSC,MXWRIT,RANDOU,NFS,NWS,LS,NWR,LWS,2,ID,         VICMAIN 00489
     1            C,     ITYPE, 2,K,     PARM, IRR)                     VICMAIN 00490
      IF(IRR.NE.0) GO TO 6170                                           VICMAIN 00491
C                                                                       VICMAIN 00492
      MXARRY = 3H W                                                     VICMAIN 00493
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      CALL WRTEMX(IAICSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,2,ID,          VICMAIN 00494
     1            W,     ITYPE, 2,K,      PARM, IRR)                    VICMAIN 00495
      IF(IRR.NE.0) GO TO 6170                                            VICMAIN 00496
C                                                                        VICMAIN 00497
      MXARRY = 3H V                                                      VICMAIN 00498
      CALL WRTEMX(IAICSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,2,ID,          VICMAIN 00499
     1            V,     ITYPE, 2,K,      PARM, IRR)                    VICMAIN 00500
      IF(IRR.NE.0) GO TO 6170                                            VICMAIN 00501
C                                                                        VICMAIN 00502
      IF(NV.NE.NVCS-NPK) GO TO 55                                        VICMAIN 00503
      END FILE IAICSC                                                    VICMAIN 00504
      REWIND IAICSC                                                      VICMAIN 00505
   55 CONTINUE                                                           VICMAIN 00506
      IF(NPLAIC.EQ.0.AND.NSPAIC.EQ.0) GO TO 1000                         VICMAIN 00507
C                                                                        VICMAIN 00508
C        WRITE THE KERNEL ON TAPE                                        VICMAIN 00509
      IF(NV.LE.NVCS-NPK) GO TO 900                                       VICMAIN 00510
C                                                                        VICMAIN 00511
C        WRITE ON THE PLANAR KERNEL TAPE                                 VICMAIN 00512
      IF(NPLAIC.EQ.0) GO TO 1000                                         VICMAIN 00513
C                                                                        VICMAIN 00514
C        DETERMINE IF A PREVIOUS MATRIX WAS ON TAPE.                     VICMAIN 00515
C        IF NKOT = 0 IT IS A NEW TAPE AND THERE ARE NO OLD ONES          VICMAIN 00516
C        IF NSIZE IS LESS THAN NROWS A MATRIX WAS EXPANDED OR THERE      VICMAIN 00517
C        WAS NONE WITH CORRESPONDING PARAMETERS                          VICMAIN 00518
C                                                                        VICMAIN 00519
      IF(NKOT.EQ.0) GO TO 60                                             VICMAIN 00520
      IF(NSIZE.GE.NROWS) GO TO 1000                                      VICMAIN 00521
C                                                                        VICMAIN 00522
   60 CONTINUE                                                           VICMAIN 00523
      NKOT = NKOT + 1                                                    VICMAIN 00524
      AMACH(NKOT) = XMACH                                                VICMAIN 00525
      AKVAL(NKOT) = K1                                                   VICMAIN 00526
      AERR(NKOT)  = ERR                                                  VICMAIN 00527
      ISIZE(NKOT) = NROWS                                                VICMAIN 00528
      REWIND NPLAIC                                                      VICMAIN 00529
      CALL RDINIT                                                        VICMAIN 00530
      NMS = NKOT - 1                                                     VICMAIN 00531
      ITYPE = 5HMIXED                                                    VICMAIN 00532
      MXARRY = 6H C                                                      VICMAIN 00533
      CALL WRTEMX(NPLAIC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,2,ID,          VICMAIN 00534
     1            C(NN), ITYPE, 2, K, PARM, IRR)                         VICMAIN 00535
      IF(IRR.NE.0) GO TO 6150                                            VICMAIN 00536
C                                                                        VICMAIN 00537
      END FILE NPLAIC                                                    VICMAIN 00538
      CALL RDINIT                                                        VICMAIN 00539
      ITYPE = 5HMIXED                                                    VICMAIN 00540
      MXARRY = 6HTAB                                                     VICMAIN 00541
      CALL WRTEMX(NPLAIC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,500,ID,        VICMAIN 00542
     1            TAB,ITYPE,NKOT,3,PARM,IRR)                             VICMAIN 00543
      IF(IRR.NE.0) GO TO 6150                                            VICMAIN 00544
C                                                                        VICMAIN 00545
      MXARRY = 6HISIZE                                                   VICMAIN 00546
      CALL WRTEMX(NPLAIC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,  LWS,1,ID,        VICMAIN 00547
     1            ISIZE,ITYPE,1,NKOT,PARM,IRR)                           VICMAIN 00548
      IF(IRR.NE.0) GO TO 6150                                            VICMAIN 00549
      END FILE NPLAIC                                                    VICMAIN 00550
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      END FILE NPLAIC                                                   VICMAIN 00551
      OPLAIC = .TRUE.                                                   VICMAIN 00552
      GO TO 1000                                                        VICMAIN 00553
  900 CONTINUE                                                          VICMAIN 00554
C                                                                       VICMAIN 00555
C         THIS AREA WILL WRITE SPATIAL KERNELS ON TAPE                  VICMAIN 00556
C         THIS TAPE WILL BE USED IN DOWNWASH AND VELOCITY POTENTIAL     VICMAIN 00557
C         CALCULATIONS.                                                 VICMAIN 00558
C         IN THE DEVELOPMENT STAGE IT WILL BE ASCERTAINED IF A TAPE     VICMAIN 00559
C         SHOULD BE SAVED FOR SUBSEQUENT RUNS.                          VICMAIN 00560
C                                                                       VICMAIN 00561
      IF(NSPAIC.EQ.0) GO TO 1000                                        VICMAIN 00562
      IF(NKST.NE.0) GO TO 910                                           VICMAIN 00563
C                                                                       VICMAIN 00564
C         THERE WAS NO OLD KERNEL TAPE THEREFORE SKIP TO NV-NPK AND     VICMAIN 00565
C         ADD TO TABLE OF CONTENTS.                                     VICMAIN 00566
C                                                                       VICMAIN 00567
      NKST = NV                                                         VICMAIN 00568
      GO TO 920                                                         VICMAIN 00569
  910 CONTINUE                                                          VICMAIN 00570
C                                                                       VICMAIN 00571
C         IF NSIZ IS LESS THAN NROWS A MATRIX WAS EXPANDED OR THERE     VICMAIN 00572
C         WAS NONE WITH CORRESPONDING PARAMETERS.                       VICMAIN 00573
C                                                                       VICMAIN 00574
      IF(NSIZ.GE.NROWS) GO TO 1000                                      VICMAIN 00575
C                                                                       VICMAIN 00576
C         THERE WAS AN OLD KERNEL TAPE THEREFORE SKIP TO NKST+1 AND     VICMAIN 00577
C         ADD TO TABLE OF CONTENTS                                      VICMAIN 00578
C                                                                       VICMAIN 00579
      NKST = NKST + 1                                                   VICMAIN 00580
  920 CONTINUE                                                          VICMAIN 00581
      AMACH(NKST) = XMACH                                               VICMAIN 00582
      AKVAL(NKST) = K1                                                  VICMAIN 00583
      AERR(NKST)  = ERR                                                 VICMAIN 00584
      YBARS(NKST) = YBAR                                                VICMAIN 00585
      VERTS(NKST) = EL                                                  VICMAIN 00586
      ISIZE(NKST) = NROWS                                               VICMAIN 00587
      REWIND NSPAIC                                                     VICMAIN 00588
      CALL RDINIT                                                       VICMAIN 00589
      ITYPE = SHMIXED                                                   VICMAIN 00590
      NWS =(NKST - 1)*4                                                 VICMAIN 00591
      MXARRY = 6HMUAIC                                                  VICMAIN 00592
      CALL WRTEMX(NSPAIC,MXWRIT,RANDOU,NFS,NWS,LS,NWR,LWS,2,ID,         VICMAIN 00593
     1            MUAIC,ITYPE,2,NROWS,PARM,IRR)                         VICMAIN 00594
      IF(IRR.NE.0) GO TO 6160                                           VICMAIN 00595
C                                                                       VICMAIN 00596
      NWS = 0                                                           VICMAIN 00597
      ITYPE = SHMIXED                                                   VICMAIN 00598
      MXARRY = 6H C                                                     VICMAIN 00599
      CALL WRTEMX(NSPAIC,MXWRIT,RANDOU,NFS,NWS,LS,NWR,LWS,2,ID,         VICMAIN 00600
     1            C, ITYPE,2,K,PARM,IRR)                                VICMAIN 00601
      IF(IRR.NE.0) GO TO 6160                                           VICMAIN 00602
C                                                                       VICMAIN 00603
      MXARRY = 6H W                                                     VICMAIN 00604
      CALL WRTEMX(NSPAIC,MXWRIT,RANDOU,NFS,NWS,LS,NWR,LWS,2,ID,         VICMAIN 00605
     1            W, ITYPE,2,K,PARM,IRR)                                VICMAIN 00606
      IF(IRR.NE.0) GO TO 6160                                           VICMAIN 00607
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C                                                                       VICMAIN 00608
      MXARRY = 6H V                                                     VICMAIN 00609
      CALL WRTEMX(NSPAIC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,2,ID,         VICMAIN 00610
     1            V, ITYPE,2,K,PARM,IRR)                                VICMAIN 00611
      IF(IRR.NE.0) GO TO 6160                                           VICMAIN 00612
C                                                                       VICMAIN 00613
      END FILE NSPAIC                                                   VICMAIN 00614
C                                                                       VICMAIN 00615
C         WRITE TABLE OF CONTENTS ARRAYS                                VICMAIN 00616
      ITYPE = 5HMIXED                                                   VICMAIN 00617
      MXARRY = 6HTAB                                                    VICMAIN 00618
      CALL WRTEMX(NSPAIC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,500,ID,       VICMAIN 00619
     1            TAB,ITYPE,NKST,3,PARM,IRR)                            VICMAIN 00620
      IF(IRR.NE.0) GO TO 6160                                           VICMAIN 00621
C                                                                       VICMAIN 00622
      MXARRY = 6HATAB                                                   VICMAIN 00623
      CALL WRTEMX(NSPAIC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,500,ID,       VICMAIN 00624
     1            ATAB,ITYPE,NKST,3,PARM,IRR)                           VICMAIN 00625
      IF(IRR.NE.0) GO TO 6160                                           VICMAIN 00626
C                                                                       VICMAIN 00627
      END FILE NSPAIC                                                   VICMAIN 00628
      END FILE NSPAIC                                                   VICMAIN 00629
      IF(NV.EQ.MVCS-NFK) OSPAIC = .TRUE.                                VICMAIN 00630
 1000 CONTINUE                                                          VICMAIN 00631
      RETURN                                                            VICMAIN 00632
C                                                                       VICMAIN 00633
 6010 CONTINUE                                                          VICMAIN 00634
      WRITE (NT6,9010) IGEOSC,IRR                                       VICMAIN 00635
      WRITE (NT6,9011) MXARRY                                           VICMAIN 00636
      GO TO 6100                                                        VICMAIN 00637
C                                                                       VICMAIN 00638
 6050 CONTINUE                                                          VICMAIN 00639
      WRITE (NT6,9050) NPLAIC,IRR                                       VICMAIN 00640
      WRITE (NT6,9011) MXARRY                                           VICMAIN 00641
      GO TO 6100                                                        VICMAIN 00642
C                                                                       VICMAIN 00643
 6060 CONTINUE                                                          VICMAIN 00644
      WRITE (NT6,9060) NSPAIC,IRR                                       VICMAIN 00645
      WRITE (NT6,9011) MXARRY                                           VICMAIN 00646
      GO TO 6100                                                        VICMAIN 00647
C                                                                       VICMAIN 00648
 6150 CONTINUE                                                          VICMAIN 00649
      WRITE (NT6,9150) NPLAIC,IRR                                       VICMAIN 00650
      WRITE (NT6,9151) MXARRY                                           VICMAIN 00651
      GO TO 6100                                                        VICMAIN 00652
C                                                                       VICMAIN 00653
 6160 CONTINUE                                                          VICMAIN 00654
      WRITE (NT6,9160) NSPAIC,IRR                                       VICMAIN 00655
      WRITE (NT6,9151) MXARRY                                           VICMAIN 00656
      GO TO 6100                                                        VICMAIN 00657
C                                                                       VICMAIN 00658
 6170 CONTINUE                                                          VICMAIN 00659
      WRITE (NT6,9160) IAICSC,IRR                                       VICMAIN 00660
      WRITE (NT6,9151) MXARRY                                           VICMAIN 00661
C                                                                       VICMAIN 00662
 6100 CONTINUE                                                          VICMAIN 00663
      WRITE (NT6,9101) ID(1),ID(2)                                      VICMAIN 00664
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      WRITE (NT6,9102) PARM,IPARM                                       VICMAIN 00665
      WRITE (NT6,9103) NFS,NMS                                          VICMAIN 00666
      WRITE (NT6,9104) ITYPE,M,N                                        VICMAIN 00667
      WRITE (NT6,9900)                                                  VICMAIN 00668
C                                                                       VICMAIN 00669
      CALL FLUSH(1)                                                     VICMAIN 00670
C                                                                       VICMAIN 00671
 6005 FORMAT(*0AIC ARRAY NO.*,I3,*, GENERATED AT AN ACCURACY OF *,F6.4,  VICMAIN 00672
     1    * IS BEING USED. * )                                         VICMAIN 00673
C                                                                       VICMAIN 00674
 9010 FORMAT(53H0*** ERROR - WHILE READING THE GEOMETRY SCRATCH FILE A1C VICMAIN 00675
     1, 15H, ERROR CODE = I4,4H *** )                                   VICMAIN 00676
 9011 FORMAT(5X,31HAN ATTEMPT WAS MADE TO READ THE A6,8H MATRIX.//)     VICMAIN 00677
 9050 FORMAT(46H0*** ERROR - WHILE READING THE PLANAR AIC FILE A10,     VICMAIN 00678
     1  15H, ERROR CODE = I4,4H *** )                                  VICMAIN 00679
 9060 FORMAT(47H0*** ERROR - WHILE READING THE SPATIAL AIC FILE A10,    VICMAIN 00680
     1  15H, ERROR CODE = I4,4H *** )                                  VICMAIN 00681
 9150 FORMAT(46H0*** ERROR - WHILE WRITING THE PLANAR AIC FILE A10,     VICMAIN 00682
     1  15H, ERROR CODE = I4,4H *** )                                  VICMAIN 00683
 9151 FORMAT(5X,32HAN ATTEMPT WAS MADE TO WRITE THE A6,8H MATRIX.//)    VICMAIN 00684
 9160 FORMAT(47H0*** ERROR - WHILE WRITING THE SPATIAL AIC FILE A10,    VICMAIN 00685
     1  15H, ERROR CODE = I4,4H *** )                                  VICMAIN 00686
C                                                                       VICMAIN 00687
 9101 FORMAT(5X,*MATRIX ID = *, A10, I10)                               VICMAIN 00688
 9102 FORMAT(5X,*PARAMETERS *,10E11.3, /10X,*(INTEGER)*, I7, 9I11 )     VICMAIN 00689
 9103 FORMAT(5X,*FILE SPACING = *,I3,* MATRIX SPACING = *,I3 )          VICMAIN 00690
 9104 FORMAT(5X,*MATRIX TYPE -*,A10,*, DIMENSIONED (*I4,2H X,I4,1H) )   VICMAIN 00691
C                                                                       VICMAIN 00692
 9900 FORMAT(*0    ERROR OCCURRED IN AIC SECTION (VICMAIN).* )          VICMAIN 00693
      END                                                               VICMAIN 00694
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      SUBROUTINE KERNEL(XMACH,K1,ERR, C, W, V )                          KERNEL  00002
      COMMON /FILES / NT5,NT6,INTAPE,INFS ,NPLAIC,NSPAIC,NOUTP,          FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC           FILES   00003
      COMMON /VICPAR/ YBAR,EL,NROWS,MUAIC(2,150)                         KERNEL  00003
      DIMENSION  XIL(4),IUC(3)                                           KERNEL  00004
      DIMENSION  C(1),  W(1),  V(1)                                      KERNEL  00005
      COMPLEX    C,W,V, CSV,WSV,VSV                                      KERNEL  00006
      DIMENSION  CTM(2), WTM(2), VTM(2)                                  KERNEL  00007
      EQUIVALENCE  (CSV,CTM), (WSV,WTM), (VSV,VTM)                       KERNEL  00008
      COMMON /BESFUN/ XIB(5), A(50,5)                                    BCSAICB 00001
      REAL K1,K1BAR                                                      KERNEL  00010
      COMPLEX ZERO                                                       KERNEL  00011
      DATA  EPS / 1.0E-4 /                                               KERNEL  00012
C                                                                        KERNEL  00013
C         XMACH - MACH NUMBER                                            KERNEL  00014
C         K1    - REDUCED FREQUENCY                                      KERNEL  00015
C         ERR   - CONVERGENCE CRITERIA (RELATIVE, NOT ABSOLUTE)          KERNEL  00016
C         C     - VELOCITY POTENTIAL AERODYNAMIC INFLUENCE COEFFICIENTS   KERNEL  00017
C         W     - UPWASH AERODYNAMIC INFLUENCE COEFFICIENTS               KERNEL  00018
C         V     - SIDEWASH AERODYNAMIC INFLUENCE COEFFICIENTS             KERNEL  00019
C                                                                        KERNEL  00020
      ZERO = (0.,0.)                                                     KERNEL  00021
      TMACH = XMACH*XMACH                                                KERNEL  00022
      K1BAR = (K1*TMACH)/(TMACH -1.0)                                    KERNEL  00023
      EL2  = EL*EL                                                       KERNEL  00024
      ITOT = 0                                                           KERNEL  00025
      NTP = 0                                                            KERNEL  00026
      IF(YBAR.EQ.0.0) NTP = -1                                           KERNEL  00027
      DO 1000 I=1,NROWS                                                  KERNEL  00028
C                                                                        KERNEL  00029
      NTP = NTP + 2                                                      KERNEL  00030
C                                                                        KERNEL  00031
      IS = ITOT+1                                                        KERNEL  00032
      IF(EL.EQ.0.0) GO TO 50                                             KERNEL  00033
      ITOT = ITOT + NTP                                                  KERNEL  00034
      GO TO 75                                                           KERNEL  00035
   50 CONTINUE                                                           KERNEL  00036
      ITOT = ITOT + I                                                    KERNEL  00037
C                                                                        KERNEL  00038
   75 CONTINUE                                                           KERNEL  00039
      IF(MUAIC(2,I).EQ.0) GO TO 1000                                     KERNEL  00040
C                                                                        KERNEL  00041
C         DETERMINE IF THERE ARE ANY BOXES ON THE I-TH ROW CUT BY THE    KERNEL  00042
C         MACH HYPERBOLA. (I=1 IS THE FIRST ROW)                         KERNEL  00043
      VBARU = FLOAT(I) - 0.5                                             KERNEL  00044
      VBARL = VBARU - 1.0                                                KERNEL  00045
      IF (ABS(EL)+EPS .GT. VBARU) GO TO 950                              KERNEL  00046
      XLOW = VBARL                                                       KERNEL  00047
      IF (ABS(EL) .GT. VBARL)  XLOW = ABS(EL)                            KERNEL  00048
      XIB(1) = XLOW                                                      KERNEL  00049
      XINC = 0.25 * (VBARU-XLOW)                                         BCSAICB 00002
      DO 105 J=2,5                                                       BCSAICB 00003
      XIB(J) = XIB(J-1) + XINC                                           KERNEL  00052
  105 CONTINUE                                                           KERNEL  00053
      DO 106 J=1,250                                                     BCSAICB 00004
      A(J) = 0.0                                                         KERNEL  00055
  106 CONTINUE                                                           KERNEL  00056
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      IWARN = 0                                                          KERNEL  00057
      DO 108 J=1,5                                                       BCSAICB 00005
      TAU = SQRT(XIB(J)*XIB(J) - EL2)                                    KERNEL  00059
      TAUKM = (K1BAR/XMACH) * TAU                                        KERNEL  00060
      XIB(J) = TAUKM                                                     KERNEL  00061
      CALL RANGE(TAUKM,N)                                                KERNEL  00062
      IF(N.LE.100) GO TO 107                                             KERNEL  00063
      WRITE (NT6,9005) N                                                 KERNEL  00064
 9005 FORMAT( 99H0*** THE ARGUMENT FOR A BESSEL FUNCTION YIELDS AN ORDER KERNEL  00065
     1 GREATER THAN 100. ORDER REDUCED TO 100. *** )                     KERNEL  00066
      N = 100                                                            KERNEL  00067
      IF(IWARN.EQ.1) GO TO 107                                           KERNEL  00068
      IWARN = 1                                                          KERNEL  00069
  107 CONTINUE                                                           KERNEL  00070
      CALL BESSEL(TAUKM,A(1,J),N)                                        KERNEL  00071
  108 CONTINUE                                                           KERNEL  00072
C                                                                        KERNEL  00073
C         THERE ARE BOXES ON THIS ROW. FIND LEFT MOST BOX AND PROCEED    KERNEL  00074
C         FROM LEFT TO RIGHT.                                            KERNEL  00075
      ULEFT = SQRT(VBARU*VBARU - EL2)                                    KERNEL  00076
      URIGHT= -ULEFT                                                     KERNEL  00077
      IHALF = (NTP+1)/2                                                  KERNEL  00078
      REM = ABS(YBAR) - 0.5                                              KERNEL  00079
      IL   = ULEFT - REM                                                 KERNEL  00080
      IL =IHALF -IL                                                      KERNEL  00081
      IR = REM - URIGHT + 1.0                                            KERNEL  00082
      IR = IHALF + IR                                                    KERNEL  00083
      IF(IL.LT.MUAIC(1,I)) GO TO 110                                     KERNEL  00084
C                                                                        KERNEL  00085
C         HYPERBOLA IS LESS THAN ALLOWED, REDUCE LIMITS.                 KERNEL  00086
      MUAIC(1,I) = IL                                                    KERNEL  00087
      GO TO 120                                                          KERNEL  00088
C                                                                        KERNEL  00089
C         HYPERBOLA CROSSED A BOUNDARY, REDUCE CALCULATIONS.             KERNEL  00090
  110 IL = MUAIC(1,I)                                                    KERNEL  00091
  120 CONTINUE                                                           KERNEL  00092
C                                                                        KERNEL  00093
C         TEST RIGHT SIDE                                                KERNEL  00094
      IF(IR.GT.MUAIC(2,I)) GO TO 130                                     KERNEL  00095
C                                                                        KERNEL  00096
C         HYPERBOLA IS LESS THAN ALLOWED, REDUCE LIMITS.                 KERNEL  00097
      MUAIC(2,I) = IR                                                    KERNEL  00098
      GO TO 140                                                          KERNEL  00099
C                                                                        KERNEL  00100
C         HYPERBOLA CROSSES A BOUNDARY, REDUCE CALCULATIONS.             KERNEL  00101
  130 IR = MUAIC(2,I)                                                    KERNEL  00102
  140 CONTINUE                                                           KERNEL  00103
C                                                                        KERNEL  00104
C         DETERMINE INTEGRALS FOR BOXES IL TO IR.                        KERNEL  00105
      IF (IL .GT. IR) GO TO 950                                          KERNEL  00106
      DO 900 ID=IL,IR                                                    KERNEL  00107
      U = IHALF - ID                                                     KERNEL  00108
      IU = U                                                             KERNEL  00109
      ULEFT = U + 0.5 + ABS(YBAR)                                        KERNEL  00110
      URIGHT= ULEFT -1.0                                                 KERNEL  00111
      YMUBAR = ULEFT - 0.5                                               KERNEL  00112
C                                                                        KERNEL  00113
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      CBARL = SQRT(ULEFT*ULEFT + EL2)                                  KERNEL  00114
      CBARR = SQRT(URIGHT*URIGHT+EL2)                                  KERNEL  00115
C                                                                      KERNEL  00116
      IF(CBARL.LE.VBARL.AND.CBARR.LE.VBARL) GO TO 500                  KERNEL  00117
C                                                                      KERNEL  00118
      IF(IU) 300,400,200                                               KERNEL  00119
C                                                                      KERNEL  00120
C        BOX IS TO THE LEFT OF THE C.. .ER LINE OR APEX                KERNEL  00121
  200 CONTINUE                                                         KERNEL  00122
      IF(CBARL.LT.VBARU) GO TO 220                                     KERNEL  00123
C                                                                      KERNEL  00124
C        EDGE BOX, ONLY HAS ONE SEGMENT TO INTEGRATE                   KERNEL  00125
      NINT = 1                                                         KERNEL  00126
      XIL(1) = CBARR                                                   KERNEL  00127
      XIL(2) = VBARU                                                   KERNEL  00128
      IUC(1) = 1                                                       KERNEL  00129
      GO TO 700                                                        KERNEL  00130
C                                                                      KERNEL  00131
C        DOUBLY CUT BOX, HAS TWO SEGMENTS TO INTEGRATE                 KERNEL  00132
  220 NINT = 2                                                         KERNEL  00133
      XIL(1) = VBARL                                                   KERNEL  00134
      IF(CBARR.GT.VBARL) XIL(1) = CBARR                                KERNEL  00135
      XIL(2) = CBARL                                                   KERNEL  00136
      XIL(3) = VBARU                                                   KERNEL  00137
      IUC(1) =1                                                        KERNEL  00138
      IUC(2) =0                                                        KERNEL  00139
      GO TO 700                                                        KERNEL  00140
C                                                                      KERNEL  00141
C        BOX IS ON THE RIGHT OF THE CENTER LINE OR APEX                KERNEL  00142
  300 CONTINUE                                                         KERNEL  00143
      IF(CBARR.LT.VBARU) GO TO 320                                     KERNEL  00144
C                                                                      KERNEL  00145
C        EDGE BOX, HAS ONLY ONE SEGMENT                                KERNEL  00146
      NINT = 1                                                         KERNEL  00147
      XIL(1) = CBARL                                                   KERNEL  00148
      XIL(2) = VBARU                                                   KERNEL  00149
      IUC(1) = 2                                                       KERNEL  00150
      GO TO 700                                                        KERNEL  00151
C                                                                      KERNEL  00152
C        DOUBLY CUT BOX, HAS TWO SEGMENTS                              KERNEL  00153
  320 NINT = 2                                                         KERNEL  00154
      XIL(1) = VBARL                                                   KERNEL  00155
      IF(CBARL.GT.VBARL) XIL(1) = CBARL                                KERNEL  00156
      XIL(2) = CBARR                                                   KERNEL  00157
      XIL(3) = VBARU                                                   KERNEL  00158
      IUC(1) = 2                                                       KERNEL  00159
      IUC(2) = 0                                                       KERNEL  00160
      GO TO 700                                                        KERNEL  00161
C                                                                      KERNEL  00162
C        CENTER LINE OR APEX BOX                                       KERNEL  00163
  400 CONTINUE                                                         KERNEL  00164
      IF(ABS(EL).LT.VBARL) GO TO 475                                   KERNEL  00165
      IF(CBARL.LT.VBARU.OR.CBARR.LT.VBARU) GO TO 420                   KERNEL  00166
C                                                                      KERNEL  00167
C        ONLY BOX ON ROW, ONLY ONE SEGMENT TO INTEGRATE                KERNEL  00168
      NINT = 1                                                         KERNEL  00169
      XIL(1) = ABS(EL)                                                 KERNEL  00170
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      XIL(2) = VBARU                                                    KERNEL  00171
      IUC(1) = 3                                                        KERNEL  00172
      GO TO 700                                                         KERNEL  00173
C                                                                       KERNEL  00174
  420 CONTINUE                                                          KERNEL  00175
      IF(CBARL.LT.VBARU.AND.CBARR.LT.VBARU) GO TO 440                   KERNEL  00176
C                                                                       KERNEL  00177
C         ONLY HAS 2 SEGMENTS                                           KERNEL  00178
      NINT = 2                                                          KERNEL  00179
      XIL(1) = ABS(EL)                                                  KERNEL  00180
      XIL(2) = CBARR                                                    KERNEL  00181
      XIL(3) = VBARU                                                    KERNEL  00182
      IUC(1)=3                                                          KERNEL  00183
      IUC(2)=1                                                          KERNEL  00184
      GO TO 700                                                         KERNEL  00185
C                                                                       KERNEL  00186
  440 CONTINUE                                                          KERNEL  00187
C                                                                       KERNEL  00188
C         UNLESS THE HYPERBOLA CENTER IS ON A BOX SIDE LINE,            KERNEL  00189
C         I.E. YBAR = 0.5, THEN THERE WILL  BE 2 SEGMENTS.              KERNEL  00190
C                                                                       KERNEL  00191
      IF(ABS(YBAR).NE.0.5) GO TO 445                                    KERNEL  00192
      XIL(1) = ABS(EL)                                                  KERNEL  00193
      XIL(2) = CBARL                                                    KERNEL  00194
      XIL(3) = VBARU                                                    KERNEL  00195
      IUC(1) = 1                                                        KERNEL  00196
      IUC(2) = 0                                                        KERNEL  00197
      NINT = 2                                                          KERNEL  00198
      GO TO 700                                                         KERNEL  00199
C                                                                       KERNEL  00200
  445 CONTINUE                                                          KERNEL  00201
C         WILL HAVE THREE SEGMENTS IF YBAR .NE. ZERO                    KERNEL  00202
      XIL(1) = ABS(EL)                                                  KERNEL  00203
      XIL(2) = CBARR                                                    KERNEL  00204
      IUC(1)= 3                                                         KERNEL  00205
      IF(ABS(YBAR).NE.0.0) GO TO 450                                    KERNEL  00206
C                                                                       KERNEL  00207
C         TWO SEGMENTS                                                  KERNEL  00208
      NINT = 2                                                          KERNEL  00209
      XIL(3) = VBARU                                                    KERNEL  00210
      IUC(2)=0                                                          KERNEL  00211
      GO TO 700                                                         KERNEL  00212
C                                                                       KERNEL  00213
C         THREE SEGMENTS                                                KERNEL  00214
  450 NINT = 3                                                          KERNEL  00215
      XIL(3) = CBARL                                                    KERNEL  00216
      IUC(2)=1                                                          KERNEL  00217
      XIL(4) = VBARU                                                    KERNEL  00218
      IUC(3)=0                                                          KERNEL  00219
      GO TO 700                                                         KERNEL  00220
C                                                                       KERNEL  00221
C         CENTER LINE BOX, BUT NOT APEX, HAS THREE SEGMENTS             KERNEL  00222
  475 CONTINUE                                                          KERNEL  00223
      IF(CBARR.LE.VBARL) GO TO 220                                      KERNEL  00224
      NINT = 3                                                          KERNEL  00225
      XIL(1) = VBARL                                                    KERNEL  00226
      XIL(2) = CBARR                                                    KERNEL  00227
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      XIL(3) = CBARL                                                    KERNEL  00228
      XIL(4) = VBARU                                                    KERNEL  00229
      IUC(1) = 3                                                        KERNEL  00230
      IUC(2) = 1                                                        KERNEL  00231
      IUC(3) = 0                                                        KERNEL  00232
      GO TO 700                                                         KERNEL  00233
C                                                                       KERNEL  00234
C        FULL BOX, ONLY ONE SEGMENT TO INTEGRATE                        KERNEL  00235
  500 CONTINUE                                                          KERNEL  00236
      NINT = 1                                                          KERNEL  00237
      XIL(1) = VBARL                                                    KERNEL  00238
      XIL(2) = VBARU                                                    KERNEL  00239
      IUC(1) = 0                                                        KERNEL  00240
C                                                                       KERNEL  00241
C        LIMITS AND TYPES FOR ALL SEGMENTS ARE COMPLETED. INTEGRATE.    KERNEL  00242
  700 CONTINUE                                                          KERNEL  00243
      IDX = ID                                                          KERNEL  00244
      IF(EL.EQ.0.0) IDX = ID - I + 1                                    KERNEL  00245
      IX = IS + IDX - 1                                                 KERNEL  00246
      IF(C(IX).NE.0) GO TO 900                                          KERNEL  00247
      DO 800 INT=1,NINT                                                 KERNEL  00248
      CSV = (0.,0.)                                                     KERNEL  00249
      WSV = (0.,0.)                                                     KERNEL  00250
      VSV = (0.,0.)                                                     KERNEL  00251
      IFLAG=0                                                           KERNEL  00252
C                                                                       KERNEL  00253
C        CALL ROMBERG INTEGRATION FOR REAL PART                         KERNEL  00254
      CALL ROMBER(XIL(INT),XIL(INT+1),IUC(INT),ERR,IFLAG,K1BAR,YMUBAR,  KERNEL  00255
     1            EL,XMACH,CTM(1),WTM(1),VTM(1) )                       KERNEL  00256
      IF(K1.EQ.0.0) GO TO 750                                           KERNEL  00257
      IFLAG = 1                                                         KERNEL  00258
C                                                                       KERNEL  00259
C        CALL ROMBERG INTEGRATION FOR IMAGINARY PART                    KERNEL  00260
      CALL ROMBER(XIL(INT),XIL(INT+1),IUC(INT),ERR,IFLAG,K1BAR,YMUBAR,  KERNEL  00261
     1            EL,XMACH,CTM(2),WTM(2),VTM(2)  )                      KERNEL  00262
  750 CONTINUE                                                          KERNEL  00263
      C(IX) = C(IX) + CSV                                               KERNEL  00264
      W(IX) = W(IX) + WSV                                               KERNEL  00265
      V(IX) = V(IX) + VSV                                               KERNEL  00266
  800 CONTINUE                                                          KERNEL  00267
C                                                                       KERNEL  00268
  900 CONTINUE                                                          KERNEL  00269
      GO TO 1000                                                        KERNEL  00270
C                                                                       KERNEL  00271
  950 CONTINUE                                                          KERNEL  00272
      MUAIC(1,I) = 0                                                    KERNEL  00273
      MUAIC(2,I) = 0                                                    KERNEL  00274
C                                                                       KERNEL  00275
 1000 CONTINUE                                                          KERNEL  00276
      RETURN                                                            KERNEL  00277
      END                                                               KERNEL  00278
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      SUBROUTINE ROMBER(XILL,XILU,IUC,ERR,IFLAG,K1BAR,YMUBAR,EL ,XMACH,  ROMBER  00002
     1                  C, W, V )                                       ROMBER  00003
      DIMENSION  XI(512),FXIC(512),FXIW(512),FXIV(512)                  ROMBER  00004
      DIMENSION  A(11,11), AW(11,11), AV(11,11), VT(2)                  ROMBER  00005
      REAL       K1BAR                                                  ROMBER  00006
      PIE = 3.141592654                                                 ROMBER  00007
C                                                                       ROMBER  00008
C         XILL   - XI LOWER LIMIT OF INTEGRATION                        ROMBER  00009
C         XILU   - XI UPPER LIMIT OF INTEGRATION                        ROMBER  00010
C         IUC    - FLAG INDICATING TYPE OF BOX OR EDGE CONDITION OF     ROMBER  00011
C                  INTERVAL TO BE INTEGRATED.                           ROMBER  00012
C                  IUC = 0, FULL BOX                                    ROMBER  00013
C                      = 1, LEFT SIDE OF INTERVAL IS EDGE OF MACH HYP.  ROMBER  00014
C                      = 2, RIGHT SIDE OF INTERVAL IS EDGE OF MACH HYP. ROMBER  00015
C                      = 3, BOTH SIDES OF INTERVAL IS EDGE OF MACH HYP. ROMBER  00016
C         ERR    - CONVERGENCE TEST CRITERIA                            ROMBER  00017
C         IFLAG  - INDICATOR OF REAL OR IMAGINARY PARTS                 ROMBER  00018
C                  IFLAG = 0, REAL PART                                 ROMBER  00019
C                        = 1, IMAGINARY PART                            ROMBER  00020
C         K1BAR  - FUNCTION OF REDUCED FREQUENCY, MACH NUMBER           ROMBER  00021
C         YMUBAR - COORDINATE HORIZONTALLY OF PULSE SENDING BOX         ROMBER  00022
C         EL     - DISTANCE OF RECEIVING BOX ABOVE SENDING PLANE        ROMBER  00023
C         XMACH  - MACH NUMBER                                          ROMBER  00024
C         C      - C COEFFICIENT                                        ROMBER  00025
C         V      - V COEFFICIENT                                        ROMBER  00026
C         W      - W COEFFICIENT                                        ROMBER  00027
C                                                                       ROMBER  00028
C                                                                       ROMBER  00029
C         CALCULATE INITIAL VALUES AT END POINTS                        ROMBER  00030
C                                                                       ROMBER  00031
      EL2 = EL+EL                                                       ROMBER  00032
      VK = -XMACH/(PIE*K1BAR)                                           ROMBER  00033
      XI(1) = XILL                                                      ROMBER  00034
      XI(2) = XILU                                                      ROMBER  00035
      CALL FUNCT(2,XI,FXIC,FXIW,IFLAG,K1BAR,EL ,YMUBAR,IUC,XMACH,BESSW) ROMBER  00036
      IF(EL.EQ.0.0) GO TO 101                                           ROMBER  00037
      IF(K1BAR.EQ.0.0) GO TO 101                                        ROMBER  00038
      IF(IUC.EQ.3) GO TO 101                                            ROMBER  00039
      CALL VFUNC (2, XI,FXIV,IFLAG,K1BAR,EL,YMUBAR,IUC,XMACH,1,VT)      ROMBER  00040
  101 CONTINUE                                                          ROMBER  00041
      TERM1 = FXIC(1)/XI(1)                                             ROMBER  00042
      TERM2 = FXIC(2)/XI(2)                                             ROMBER  00043
      HINT = 0.5*(XILU-XILL)                                            ROMBER  00044
      TC = HINT *(FXIC(1)+FXIC(2))                                      ROMBER  00045
      TW = HINT *(FXIW(1)+FXIW(2))                                      ROMBER  00046
      A(1,1)  = TC                                                      ROMBER  00047
      AW(1,1) = TW                                                      ROMBER  00048
      IF(EL.EQ.0.0) GO TO 102                                           ROMBER  00049
      IF(K1BAR.EQ.0.0) GO TO 102                                        ROMBER  00050
      IF(IUC.EQ.3) GO TO 102                                            ROMBER  00051
      TV = HINT *(FXIV(1)+FXIV(2))                                      ROMBER  00052
      AV(1,1) = TV                                                      ROMBER  00053
  102 CONTINUE                                                          ROMBER  00054
C                                                                       ROMBER  00055
      DO 30 M=2,11                                                      ROMBER  00056
      I= 2**(M-1)                                                       ROMBER  00057
      H = (XILU - XILL)/I                                               ROMBER  00058
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C                                                                       ROMBER  00059
C         DETERMINE XI LOCATIONS TO EVALUATE FUNCTION AT                ROMBER  00060
      DO 3 J=2,I,2                                                      ROMBER  00061
      JJ = J/2                                                          ROMBER  00062
      XI(JJ) = XILL + (J-1)*H                                           ROMBER  00063
    3 CONTINUE                                                          ROMBER  00064
      CALL FUNCT(JJ,XI,FXIC,FXIW,IFLAG,K1BAR,EL ,YMUBAR,IUC,XMACH,DUMMY) ROMBER  00065
      IF(EL.EQ.0.0) GO TO 103                                           ROMBER  00066
      IF(K1BAR.EQ.0.0) GO TO 103                                        ROMBER  00067
      IF(IUC.EQ.3) GO TO 103                                            ROMBER  00068
      CALL VFUNC (JJ,XI,FXIV,IFLAG,K1BAR,EL,YMUBAR,IUC,XMACH,0,DUMMY)   ROMBER  00069
  103 CONTINUE                                                          ROMBER  00070
C                                                                       ROMBER  00071
C         DETERMINE TRAPEZOIDAL AREA WITH THE NEW FUNCTION EVALUATIONS  ROMBER  00072
      TMNC = 0.0                                                        ROMBER  00073
      TMNW = 0.0                                                        ROMBER  00074
      TMNV = 0.0                                                        ROMBER  00075
      DO 5 J=1,JJ                                                       ROMBER  00076
      TMNC = TMNC + FXIC(J)                                             ROMBER  00077
      TMNW = TMNW + FXIW(J)                                             ROMBER  00078
      IF(EL.EQ.0.0) GO TO 5                                             ROMBER  00079
      IF(K1BAR.EQ.0.0) GO TO 5                                          ROMBER  00080
      IF(IUC.NE.3)TMNV = TMNV + FXIV(J)                                 ROMBER  00081
    5 CONTINUE                                                          ROMBER  00082
      TC = 0.5*TC + H*TMNC                                              ROMBER  00083
      TW = 0.5*TW + H*TMNW                                              ROMBER  00084
C                                                                       ROMBER  00085
C         PUT THE NEW AREAS INTO THE ARRAY AND PERFORM EXTRAPOLATION    ROMBER  00086
      A(M,1) = TC                                                       ROMBER  00087
      AW(M,1)= TW                                                       ROMBER  00088
      IF(EL.EQ.0.0) GO TO 104                                           ROMBER  00089
      IF(K1BAR.EQ.0.0) GO TO 104                                        ROMBER  00090
      IF(IUC.EQ.3) GO TO 104                                            ROMBER  00091
      TV = 0.5*TV + H*TMNV                                              ROMBER  00092
      AV(M,1) = TV                                                      ROMBER  00093
  104 CONTINUE                                                          ROMBER  00094
      DO 10 N=2,M                                                       ROMBER  00095
      A(M,N) = ((4**(N-1))*A(M,N-1)-A(M-1,N-1))/(4**(N-1)-1)            ROMBER  00096
      AW(M,N)= ((4**(N-1))*AW(M,N-1)-AW(M-1,N-1))/(4**(N-1)-1)          ROMBER  00097
      IF(EL.EQ.0.0) GO TO 10                                            ROMBER  00098
      IF(K1BAR.EQ.0.0) GO TO 10                                         ROMBER  00099
      IF(IUC.EQ.3) GO TO 10                                             ROMBER  00100
      AV(M,N)= ((4**(N-1))*AV(M,N-1)-AV(M-1,N-1))/(4**(N-1)-1)          ROMBER  00101
   10 CONTINUE                                                          ROMBER  00102
C                                                                       ROMBER  00103
C         DETERMINE IF THE TECHNIQUE HAS REACHED SUFFICIENT CONVERGENCE ROMBER  00104
      C = A(M,M)                                                        ROMBER  00105
      W = AW(M,M)                                                       ROMBER  00106
      IF(EL.EQ.0.0) GO TO 105                                           ROMBER  00107
      IF(K1BAR.EQ.0.0) GO TO 105                                        ROMBER  00108
      IF(IUC.EQ.3) GO TO 105                                            ROMBER  00109
      V = AV(M,M)                                                       ROMBER  00110
  105 CONTINUE                                                          ROMBER  00111
      RERR = ABS(ERR*C)                                                 ROMBER  00112
      MM1 = M-1                                                         ROMBER  00113
      UDIF = ABS(A(M,MM1)-A(MM1,MM1))                                   ROMBER  00114
      RDIF = ABS(A(M,M)  -A(M  ,MM1))                                   ROMBER  00115
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      DELS = 0.5*(UDIF+RDIF)                                          ROMBER  00116
      IF(DELS.GT.RERR) GO TO 30                                       ROMBER  00117
C                                                                     ROMBER  00118
C        C HAS CONVERGED,  TEST FOR W CONVERGENCE                     ROMBER  00119
      IF(EL.EQ.0.0) GO TO 50                                          ROMBER  00120
      RERR = ABS(ERR*W)                                               ROMBER  00121
      UDIF = ABS(AW(M,MM1) - AW(MM1,MM1))                             ROMBER  00122
      RDIF = ABS(AW(M,M)   - AW(M  ,MM1))                             ROMBER  00123
      DELS = 0.5 *(UDIF + RDIF)                                       ROMBER  00124
      IF(DELS.GT.RERR) GO TO 30                                       ROMBER  00125
C                                                                     ROMBER  00126
C        C AND W HAVE CONVERGED, TEST FOR V CONVERGENCE               ROMBER  00127
C                                                                     ROMBER  00128
      IF(K1BAR.EQ.0.0 .OR. IUC.EQ.3) GO TO 50                         ROMBER  00129
      RERR = ABS(ERR*V)                                               ROMBER  00130
      UDIF = ABS(AV(M,MM1) - AV(MM1,MM1))                             ROMBER  00131
      RDIF = ABS(AV(M,M)   - AV(MM1,MM1))                             ROMBER  00132
      DELS = 0.5 *(UDIF + RDIF)                                       ROMBER  00133
      IF(DELS.LE.RERR) GO TO 50                                       ROMBER  00134
C                                                                     ROMBER  00135
C        HAS NOT CONVERGED MAKE ANOTHER LOOP.                         ROMBER  00136
   30 CONTINUE                                                        ROMBER  00137
   50 CONTINUE                                                        ROMBER  00138
      C = -C/PIE                                                      ROMBER  00139
      IF(EL .EQ.0.0) GO TO 70                                         ROMBER  00140
      W  = (EL/PIE)*(W*TERM2-TERM1  + BESSW )                         ROMBER  00141
      IF(K1BAR.EQ.0.0) GO TO 65                                       ROMBER  00142
      IF(IUC.EQ.3) GO TO 70                                           ROMBER  00143
      V = VK*(V +VT(2)-VT(1))                                         ROMBER  00144
      GO TO 70                                                        ROMBER  00145
   65 CONTINUE                                                        ROMBER  00146
      ETAL = YMUBAR - 0.5                                             ROMBER  00147
      IF(IUC.EQ.2) ETAL = - SQRT(XILU*XILU - EL2)                     ROMBER  00148
      ETAU = YMUBAR + 0.5                                             ROMBER  00149
      IF(IUC.EQ.1) ETAU =   SQRT(XILU*XILU - EL2)                     ROMBER  00150
      XILU2 = XILU * XILU                                             ROMBER  00151
      XILL2 = XILL * XILL                                             ROMBER  00152
      ETAU2 = ETAU * ETAU                                             ROMBER  00153
      ETAL2 = ETAL * ETAL                                             ROMBER  00154
      SU = ETAU2 + EL2                                                ROMBER  00155
      SL = ETAL2 + EL2                                                ROMBER  00156
      S1 = XILU2 - SU                                                 ROMBER  00157
      S2 = XILU2 - SL                                                 ROMBER  00158
      S3 = XILL2 - SU                                                 ROMBER  00159
      S4 = XILL2 - SL                                                 ROMBER  00160
      V1 = 0.0                                                        ROMBER  00161
      V2 = 0.0                                                        ROMBER  00162
      V3 = 0.0                                                        ROMBER  00163
      V4 = 0.0                                                        ROMBER  00164
      IF(S1.GT.0.0) V1 = ALOG((XILU+SQRT(S1))/SQRT(SU))               ROMBER  00165
      IF(S2.GT.0.0) V2 = ALOG((XILU+SQRT(S2))/SQRT(SL))               ROMBER  00166
      IF(S3.GT.0.0) V3 = ALOG((XILL+SQRT(S3))/SQRT(SU))               ROMBER  00167
      IF(S4.GT.0.0) V4 = ALOG((XILL+SQRT(S4))/SQRT(SL))               ROMBER  00168
      V = (-1.0/PIE)*(V1-V2-V3+V4)                                    ROMBER  00169
   70 CONTINUE                                                        ROMBER  00170
      RETURN                                                          ROMBER  00171
      END                                                             ROMBER  00172
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      SUBROUTINE FUNCT(K,XI,FXIC,FXIW,IFLAG,K1BAR,EL ,YMUBAR,IUC,      FUNCT  00002
     1                 XMACH,BESSY)                                    FUNCT  00003
      DIMENSION  XI(512),FXIC(512),FXIW(512),A(50)                     FUNCT  00004
C                                                                      FUNCT  00005
C        K      - NUMBER OF FUNCTIONS TO EVALUATE                      FUNCT  00006
C        XI     - VARIABLE OF INTEGRATION                              FUNCT  00007
C        FXIC   - FUNCTIONAL VALUE FOR C EQUATION                      FUNCT  00008
C        FXIW   - FUNCTIONAL VALUE FOR W EQUATION                      FUNCT  00009
C        IFLAG  - INDICATOR OF REAL OR IMAGINARY PARTS                 FUNCT  00010
C                 IFLAG = 0, REAL PART                                 FUNCT  00011
C                 IFLAG = 1, IMAGINARY PART                            FUNCT  00012
C        K1BAR  - FUNCTION OF REDUCED FREQUENCY AND MACH NUMBER        FUNCT  00013
C        EL     - DISTANCE OF RECEIVING BOX ABOVE SENDING PLANE        FUNCT  00014
C        YMUBAR - COORDINATE HORIZONTALLY OF PULSE SENDING BOX         FUNCT  00015
C        IUC    - FLAG INDICATING TYPE OF BOX OR EDGE CONDITION OF     FUNCT  00016
C                 INTERVAL TO BE INTEGRATED.                           FUNCT  00017
C        XMACH  - MACH NUMBER                                          FUNCT  00018
C        BESSY  - EVALUATION OF END POINTS FOR W COEFFICIENTS.         FUNCT  00019
C                                                                      FUNCT  00020
      REAL    K1BAR                                                    FUNCT  00021
      PIE = 3.141592654                                                FUNCT  00022
      PIE2 = 1.570796327                                               FUNCT  00023
      EL2 = EL*EL                                                      FUNCT  00024
      BESSY = 0.0                                                      FUNCT  00025
C                                                                      FUNCT  00026
      DO 1000  I=1,K                                                   FUNCT  00027
C                                                                      FUNCT  00028
C        SET UP CONSTANTS                                              FUNCT  00029
      TAU = SQRT(XI(I)*XI(I) - EL2)                                    FUNCT  00030
      TAUKM = (K1BAR/XMACH)*TAU                                        FUNCT  00031
      EPOW = K1BAR*XI(I)                                               FUNCT  00032
      IF(ABS(TAU).LT.1.0E-06) GO TO 25                                 FUNCT  00033
      THETAU = (YMUBAR + 0.5)/TAU                                      FUNCT  00034
      THETAL = (YMUBAR-0.5)/TAU                                        FUNCT  00035
      GO TO 50                                                         FUNCT  00036
   25 CONTINUE                                                         FUNCT  00037
      THETAL = 0.0                                                     FUNCT  00038
      THETAU = 0.0                                                     FUNCT  00039
   50 CONTINUE                                                         FUNCT  00040
C                                                                      FUNCT  00041
      IF(IFLAG.EQ.0) GO TO 100                                         FUNCT  00042
C                                                                      FUNCT  00043
C        IMAGINARY PART                                                FUNCT  00044
      EXPN = -SIN(EPOW)                                                FUNCT  00045
      EXPNW = (EPOW*COS(EPOW) - SIN(EPOW))/(XI(I)*XI(I))               FUNCT  00046
      GO TO 200                                                        FUNCT  00047
C                                                                      FUNCT  00048
C        REAL PART                                                     FUNCT  00049
  100 EXPN = COS(EPOW)                                                 FUNCT  00050
      EXPNW =(COS(EPOW) + EPOW*SIN(EPOW))/(XI(I)*XI(I))                FUNCT  00051
C                                                                      FUNCT  00052
  200 CONTINUE                                                         FUNCT  00053
      CALL BFUNC(TAUKM,A,N)                                            FUNCT  00054
      IF(EL .EQ.0.0) GO TO 250                                         FUNCT  00055
      IF(I.GT.1) GO TO 250                                             FUNCT  00056
      IF(IUC.NE.3) GO TO 250                                           FUNCT  00057
      EXL =  ABS(EL) - XI(1)                                           FUNCT  00058
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      IF(ABS(EXL).GT.1.0E-05) GO TO 250                                  FUNCT  00059
      BESSY = (EXPN*PIE)/EL                                              FUNCT  00060
  250 CONTINUE                                                           FUNCT  00061
      BESSO = A(1)                                                       FUNCT  00062
      PTERM = 0.0                                                        FUNCT  00063
      IF(IUC.EQ.0.OR.IUC.EQ.2) GO TO 300                                 FUNCT  00064
C                                                                        FUNCT  00065
C             LEFT SIDE IS BOUNDARY CONDITION                            FUNCT  00066
      C1 = PIE2                                                          FUNCT  00067
      GO TO 400                                                          FUNCT  00068
C                                                                        FUNCT  00069
  300 CONTINUE                                                           FUNCT  00070
      IF(ABS(THETAU).GE.1.0) GO TO 350                                   FUNCT  00071
      C1 = ASIN(THETAU)                                                  FUNCT  00072
      GO TO 400                                                          FUNCT  00073
  350 CONTINUE                                                           FUNCT  00074
      C1 = SIGN(PIE2,THETAU)                                             FUNCT  00075
C                                                                        FUNCT  00076
  400 CONTINUE                                                           FUNCT  00077
      IF(IUC.LE.1) GO TO 500                                             FUNCT  00078
C                                                                        FUNCT  00079
C         RIGHT SIDE IS BOUNDARY CONDITION                               FUNCT  00080
      C2 = -PIE2                                                         FUNCT  00081
      GO TO 600                                                          FUNCT  00082
C                                                                        FUNCT  00083
  500 CONTINUE                                                           FUNCT  00084
      IF(ABS(THETAL).GE.1.0) GO TO 550                                   FUNCT  00085
      C2 = ASIN(THETAL)                                                  FUNCT  00086
      GO TO 600                                                          FUNCT  00087
  550 CONTINUE                                                           FUNCT  00088
      C2 = SIGN(PIE2,THETAL)                                             FUNCT  00089
  600 CONTINUE                                                           FUNCT  00090
C                                                                        FUNCT  00091
      IF(IUC.EQ.3) GO TO 900                                             FUNCT  00092
      IF (N .EQ. 1) GO TO 900                                            FUNCT  00093
C                                                                        FUNCT  00094
      SIGNX = -1.0                                                       FTN01  00049
      R= 0                                                               FUNCT  00096
      PSIGN = 1.0                                                        FUNCT  00097
      N = (N+1)/2                                                        FUNCT  00098
      DO 800 IR=2,N                                                      FUNCT  00099
      R = R +1                                                           FUNCT  00100
      PSIGN = PSIGN * SIGNX                                              FTN01  00050
      PTERM = PSIGN/R                                                    FUNCT  00102
      BTERM = BTERM + PTERM*A(IR)*(SIN(2.0*R*C1) - SIN(2.0*R*C2))        FUNCT  00103
  800 CONTINUE                                                           FUNCT  00104
C                                                                        FUNCT  00105
  900 CONTINUE                                                           FUNCT  00106
      FXIC(I) = EXPN *(BESSO*(C1-C2) + BTERM )                           FUNCT  00107
      FXIW(I) = 0.0                                                      FUNCT  00108
      IF(EL2.EQ.0.0) GO TO 1000                                          FUNCT  00109
      FXIW(I) = EXPN**(BESSO*(C1-C2) + BTERM )                           FUNCT  00110
C                                                                        FUNCT  00111
 1000 CONTINUE                                                           FUNCT  00112
      RETURN                                                             FUNCT  00113
      END                                                                FUNCT  00114
```

```
      SUBROUTINE BESSEL(K12,A,NA)                                       BESSEL  00002
      DIMENSION  A(1), AV(150)                                          BESSEL  00003
      REAL K12                                                          BESSEL  00004
C                                                                       BESSEL  00005
C        K12 - FUNCTION OF XI VALUE, MACH NUMBER AND REDUCED FREQUENCY  BESSEL  00006
C        A      = EVALUATION OF THE BESSEL FUNCTION                     BESSEL  00007
C        NA  - ORDER OF THE BESSEL FUNCTION TO BE EVALUATED             BESSEL  00008
C                                                                       BESSEL  00009
      ALPHA = 1.E-25                                                    BESSEL  00010
      NT = NA + 1                                                       BESSEL  00011
      BETA=.0008                                                        BESSEL  00012
      IF(K12-BETA) 76,76,78                                             BESSEL  00013
   78 CONTINUE                                                          BESSEL  00014
      IF(K12-ALPHA)76,76,20                                             BESSEL  00015
   76 CONTINUE                                                          BESSEL  00016
        (2) = 0.                                                        BESSEL  00017
      A(1) = 1.                                                         BESSEL  00018
      GO TO 99                                                          BESSEL  00019
   20 SUM = 0.                                                          BESSEL  00020
      K = 1.5*K12 + 1.                                                  BESSEL  00021
      NP = MAXO(K,NT)                                                   BESSEL  00022
      I = NP+11                                                         BESSEL  00023
      AV(I+2) = 0.0                                                     BESSEL  00024
      AV(I+1) = ALPHA                                                   BESSEL  00025
   30 AV(I) = AV(I+1)*I*2./K12-AV(I+2)                                  BESSEL  00026
      IF (I-1) 40, 40, 50                                               BESSEL  00027
   50 IF (MOD(I,2)) 60, 70, 60                                          BESSEL  00028
   60 SUM = SUM + AV(I)                                                 BESSEL  00029
   70 I = I-1                                                           BESSEL  00030
      GO TO 30                                                          BESSEL  00031
   40 C = 1./(2.*SUM+AV(1))                                             BESSEL  00032
      I = 1                                                             BESSEL  00033
      DO 90 II=1,NA,2                                                   BESSEL  00034
      A(I) = AV(II) * C                                                 BESSEL  00035
      I = I + 1                                                         BESSEL  00036
      IF(I.EQ.50) GO TO 99                                              BCSAICA 00001
   90 CONTINUE                                                          BESSEL  00037
   99 CONTINUE                                                          BESSEL  00038
      RETURN                                                            BESSEL  00039
      END                                                               BESSEL  00040
```

```
      SUBROUTINE RANGE(K12,NA)                                          RANGE   00002
      REAL K12                                                          RANGE   00003
C                                                                       RANGE   00004
C     CALCULATES THE RANGE ON THE VARIABLE N FOR SUBROUTINE BESSL       RANGE   00005
C                                                                       RANGE   00006
C                                                                       RANGE   00007
C         K12    = FUNCTION OF X VALUE, MACH NUMBER AND REDUCED         RANGE   00008
C                  FREQUENCY                                            RANGE   00009
C         NA  - ORDER OF THE BESSEL FUNCTION TO BE EVALUATED            RANGE   00010
C                                                                       RANGE   00011
  400 CONTINUE                                                          RANGE   00012
C                                                                       RANGE   00013
      IF(K12- 0.01) 101,98,98                                           RANGE   00014
   98 IF(K12- 3.00) 102,102,99                                          RANGE   00015
   99 IF(K12-19.00) 103,103,100                                         RANGE   00016
  100  GO TO 104                                                        RANGE   00017
C                                                                       RANGE   00018
  101 CONTINUE                                                          RANGE   00019
      NA=4                                                              RANGE   00020
      RETURN                                                            RANGE   00021
  102 CONTINUE                                                          RANGE   00022
      NA= 3.0*K12 +7.0                                                  RANGE   00023
      RETURN                                                            RANGE   00024
  103 CONTINUE                                                          RANGE   00025
      NA= 2.0*K12 +7.0                                                  RANGE   00026
      RETURN                                                            RANGE   00027
  104 CONTINUE                                                          RANGE   00028
      NA= (10.0/9.)*K12 + 29.                                           RANGE   00029
      RETURN                                                            RANGE   00030
      END                                                               RANGE   00031
```

```
      SUBROUTINE VFUNC(K,XI,FXIV,IFLAG,K1BAR,EL,YMUBAR,IUC,XMACH,IND,VT) VFUNCT  00002
      DIMENSION XI(256),FXIV(256),VT(2)                                 VFUNCT  00003
      REAL K1BAR                                                        VFUNCT  00004
C                                                                       VFUNCT  00005
C        THIS PROGRAM CALCULATES THE FUNCTION VALUES OF INTEGRATION     VFUNCT  00006
C        FOR THE V COEFFICIENTS.                                        VFUNCT  00007
C                                                                       VFUNCT  00008
C        K      - NUMBER OF VALUES TO CALCULATE                         VFUNCT  00009
C        XI     - VARIABLE ARRAY AT WHICH VALUES ARE CALCULATED.        VFUNCT  00010
C        FXIV   - FUNCTIONAL VALUES                                     VFUNCT  00011
C        IFLAG  = FLAG INDICATING REAL OR COMPLEX PART                  VFUNCT  00012
C                 IFLAG = 0, REAL PART                                  VFUNCT  00013
C                       = 1, IMAGINARY PART                             VFUNCT  00014
C        K1BAR  - FUNCTION OR REDUCED FREQUENCY AND MACH NUMBER.        VFUNCT  00015
C        EL     - DISTANCE OF RECEIVING BOX ABOVE SENDING PLANE.        VFUNCT  00016
C        YMUBAR - COORDINATE HORIZONTALLY OF PULSE SENDING PLANE.       VFUNCT  00017
C        IUC    - FLAG INDICATING TYPE OF BOX OR EDGE CONDITION OF      VFUNCT  00018
C                 INTERVAL TO BE INTEGRATED.                            VFUNCT  00019
C        XMACH  - MACH NUMBER                                           VFUNCT  00020
C        IND    - INDICATOR TO CALCULATE VT TERMS                       VFUNCT  00021
C                 = 0, DO NOT CALCULATE                                 VFUNCT  00022
C                 = 1, CALCULATE                                        VFUNCT  00023
C        VT     - EXTRA TERMS CALCULATE AT THE LIMITS OF INTEGRATION    VFUNCT  00024
C                                                                       VFUNCT  00025
      EPS = 1.0E-04                                                     VFUNCT  00026
      EL2 = EL*EL                                                       VFUNCT  00027
          DO 500 I=1,K                                                  VFUNCT  00028
C                                                                       VFUNCT  00029
C         CALCULATE CONSTANTS                                           VFUNCT  00030
      EPOW = K1BAR*XI(I)                                                VFUNCT  00031
          XI2  = XI(I)*XI(I)                                            VFUNCT  00032
      FREQM = K1BAR/XMACH                                               VFUNCT  00033
      YMUP2 = (YMUBAR + 0.5)*(YMUBAR + 0.5)                             VFUNCT  00034
      YMUM2 = (YMUBAR - 0.5)*(YMUBAR - 0.5)                             VFUNCT  00035
C                                                                       VFUNCT  00036
      IF(IFLAG.EQ.0) GO TO 100                                          VFUNCT  00037
C                                                                       VFUNCT  00038
C         IMAGINARY PART                                                VFUNCT  00039
      EXPN = (EPOW*COS(EPOW)-SIN(EPOW))/XI2                             BCSAICA 00002
      IF(IND.EQ.1) EXPNV = -SIN(EPOW)                                   BCSAICA 00003
      GO TO 200                                                         VFUNCT  00042
C                                                                       VFUNCT  00043
C         REAL PART                                                     VFUNCT  00044
  100 EXPN = (COS(EPOW)+EPOW*SIN(EPOW))/XI2                             BCSAICA 00004
      IF(IND.EQ.1) EXPNV =  COS(EPOW)                                   BCSAICA 00005
C                                                                       VFUNCT  00047
  200 CONTINUE                                                          VFUNCT  00048
      C1 = 0.0                                                          VFUNCT  00049
      C2 = 0.0                                                          VFUNCT  00050
      IF(IUC.EQ.1) GO TO 300                                            VFUNCT  00051
C                                                                       VFUNCT  00052
      C1R = XI2 - YMUP2 - EL2                                           VFUNCT  00053
      IF(ABS(C1R).LT.EPS) GO TO 300                                     VFUNCT  00054
      C1 = SIN(FREQM*SQRT(C1R))                                         VFUNCT  00055
C                                                                       VFUNCT  00056
  300 CONTINUE                                                          VFUNCT  00057
      IF(IUC.EQ.2) GO TO 400                                            VFUNCT  00058
```

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C                                                                       VFUNCT  00059
      C2R = XI2 - YMUM2 - EL2                                           VFUNCT  00060
      IF(ABS(C2R).LT.EPS) GO TO 400                                     VFUNCT  00061
      C2 = SIN(FREQM*SQRT(C2R))                                         VFUNCT  00062
C                                                                       VFUNCT  00063
  400 CONTINUE                                                          VFUNCT  00064
      FXIV(I) = EXPN * (C1-C2)                                          BCSAICA 00006
      IF(IND.EQ.1) VT(I) =(EXPNV/XI(I)) * (C1-C2)                       BCSAICA 00007
  500 CONTINUE                                                          VFUNCT  00067
      RETURN                                                            VFUNCT  00068
      END                                                               VFUNCT  00069
```

```
      SUBROUTINE BFUNC(X,AV,N)                                          BFUNC   00002
C                                                                       BFUNC   00003
C         X   - ARGUMENT FO THE BESSEL FUNCTION                         BFUNC   00004
C         AV - EVALUATION OF BESSEL FUNCTION                            BFUNC   00005
C         N   - MAX ORDER OF BESSEL FUNCTION                            BFUNC   00006
C                                                                       BFUNC   00007
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,         FILES   00002
                      IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC          FILES   00003
      COMMON /BESFUN/ XIB(5), A(50,5)                                   BCSAICB 00006
      DIMENSION  AV(1)                                                  BFUNC   00010
C                                                                       BFUNC   00011
C         FIND INTERVAL X IS IN                                         BFUNC   00012
      IF(X.GE.XIB(1).AND.X.LE.XIB(5)) GO TO 50                          BCSAICB 00007
      EPS = 1.0E-04                                                     BFUNC   00014
      I = 1                                                             BFUNC   00015
      IF (ABS(X-XIB(I)) .LE. EPS*XIB(I)) GO TO 150                      BFUNC   00016
      I= 5                                                              BCSAICB 00008
      IF (ABS(X-XIB(I)) .LE. EPS*XIB(I)) GO TO 150                      BFUNC   00018
      WRITE (NT6,9005) X,XIB(1),XIB(5)                                  BCSAICB 00009
 9005 FORMAT( 68H0*** ERROR - THE ARGUMENT FOR A BESSEL FUNCTION IS OUT  BFUNC   00020
     1OF RANGE. ***/  14HOARGUMENT    = F11.6/14H LOWER LIMIT = F11.6 /  BFUNC   00021
     2    14H UPPER LIMIT = F11.6 )                                     BFUNC   00022
      CALL FLUSH(1)                                                     BFUNC   00023
   50 CONTINUE                                                          BFUNC   00024
      I = 2                                                             BFUNC   00025
  100 IF(X-XIB(I)) 200,150,125                                          BFUNC   00026
  125 CONTINUE                                                          BFUNC   00027
      I = I + 1                                                         BFUNC   00028
      GO TO 100                                                         BFUNC   00029
  150 CONTINUE                                                          BFUNC   00030
C                                                                       BFUNC   00031
C         X EQUALS XIB(I)   DO NOT INTERPOLATE                          BFUNC   00032
C                                                                       BFUNC   00033
      N = 1                                                             BFUNC   00034
  160 CONTINUE                                                          BFUNC   00035
      AV(N) = A(N,I)                                                    BFUNC   00036
      IF(A(N+1,I).EQ.0) GO TO 400                                       BFUNC   00037
      N = N + 1                                                         BFUNC   00038
      GO TO 160                                                         BFUNC   00039
  200 CONTINUE                                                          BFUNC   00040
      DXX = (X-XIB(I-1))/(XIB(I) -XIB(I-1))                             BFUNC   00041
      N = 1                                                             BFUNC   00042
  300 CONTINUE                                                          BFUNC   00043
      AV(N) = A(N,I-1) + DXX * (A(N,I) - A(N,I-1))                      BFUNC   00044
      IF(A(N+1,I-1).EQ.0.) GO TO 400                                    BFUNC   00045
      N = N+ 1                                                          BFUNC   00046
      GO TO 300                                                         BFUNC   00047
  400 CONTINUE                                                          BFUNC   00048
      RETURN                                                            BFUNC   00049
      END                                                               BFUNC   00050
```

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      OVERLAY(AFMBOX,1,5)                                                NAVPMBX 00002
      PROGRAM NAVPMBX                                                    NAVPMBX 00003
C                                                                        NAVPMBX 00004
C         THIS SECTION CONTROLS THE COMPUTATION OF BOX NORMAL WASH       NAVPMBX 00005
C         VALUES AND VELOCITY POTENTIAL DIFFERENCES.  THE NORMAL WASH    NAVPMBX 00006
C         VALUES MAY BE PRINTED, BUT OTHERWISE ARE NOT SAVED.  THE       NAVPMBX 00007
C         VELOCITY POTENTIAL DIFFERENCES ARE PLACED ON SCRATCH FILE      NAVPMBX 00008
C         IVPSC, TWO MATRICES PER MODE SHAPE                             NAVPMBX 00009
C                                                                        NAVPMBX 00010
      COMMON PKERNL(1640)                                                NAVPMBX 00011
      COMPLEX PKERNL                                                     NAVPMBX 00012
      COMMON /CONTRL/ PREVEX,OMACH, TITLE(8), PRVGEOM,PRVMODE,DIHW,DIHT, CONTRL  00002
     1                DEFAULT                                           CONTRL  00003
      LOGICAL     PRVGEOM,PRVMODE,DIHW,DIHT,DEFAULT                      CONTRL  00004
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,     PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                               PROBLM  00003
      LOGICAL         SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                  PROBLM  00004
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,          GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,               GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,          GEOMTY  00004
     3                IXBW,XCENTR                                        GEOMTY  00005
      LOGICAL COPLAN                                                     GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,MXBT,MYBT,MYBBT,MXBST,MYBST,       GEOM2   00002
     1                MYBBST,IXBT,IXBST,CAPL                            GEOM2   00003
      COMMON / KERN / ERR,MXSKRN,IPKERN,NPUKRN,NSPATK,NROWEA             KERN    00002
      COMMON /KVAL  / IKVAL,XKVAL(20), XKS(20)                           KVAL    00002
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,          FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC          FILES   00003
      COMMON /IOCONT/ OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,       IOCONT  00002
     1                PRPAIC,PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,        IOCONT  00003
     2                PRBL,PRDCP,PRGNAF,PRGNAC,PRSL,PRLW,PRNW,PRCM       BCSFRB  00001
      EQUIVALENCE (PRUW,PRDW)                                            IOCONT  00005
      LOGICAL    OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,PRPAIC,     IOCONT  00006
     1           PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,PRBL,PRSL,PRGNAF,   IOCONT  00007
     2           PRDCP,PRGNAC,PRUW,PRLW,PRNW,PRCM                        BCSFRB  00002
      COMMON /TAPEIO/ NFS,NHS,LS,NWR,ID(20),NID,ITYPE,LRS,LWS,M,N,       TAPEIO  00002
     1                PARM(10),IRR                                      TAPEIO  00003
      DIMENSION IPARM(10)                                                TAPEIO  00004
      EQUIVALENCE (PARM,IPARM)                                           TAPEIO  00005
      COMMON / MODES/ SYM,SYMT,MTYPEW,MTYPET                             MODCOM  00002
      COMMON /ARRAYS/ KBXCDW,LBXCDW,LBOXC,KBXCDT,LBXCDT,KJALPH,LJALPH,   ARRAYS  00002
     1                KALPHA,KKERNL,LKERNL,KPNTRM,LPNTRM,KDEFSL,KELPHI,  ARRAYS  00003
     2                LMODES,KPNTSD,LPNTSD,KSDW,LSDW,KPNTDW,LPNTDW,      ARRAYS  00004
     3                KDW,LDW,KTVP,LTVP                                  ARRAYS  00005
      COMMON /SAMPLW/ ISMPLW,ICHORD(10),IBOXF(10),IBOXL(10),ZLOC(10)     SAMPLW  00002
      COMMON /PAICS / NAAK,  NTTK,  NRWTK,  XLETK,   PAIC(4,50)          PAICS   00002
      INTEGER PAIC                                                       PAICS   00003
      DIMENSION NK(4)                                                    PAICS   00004
      EQUIVALENCE (NAAK,NK(1))                                           PAICS   00005
      COMMON /MJAICS/ YBAR,EL,MJAIC(2,50),NROWS,SURF,                    MJAICS  00002
     1                YBARL,ELL, MJAICL(2,50),NROWSL,SURFL,PSIDIF        MJAICS  00003
      LOGICAL SURF,SURFL                                                 MJAICS  00004
      COMMON /AICS  / XKVL,   C(1640),W(1640),V(1640)                    AICS    00002
      COMPLEX                 C,      W,      V                          AICS    00003
C                    DELPHI(LMODES),TVP(LTVP),TEXLOC(LTVP)               DELTAP  00002
      COMMON /DELTAP/ DELPHI(1080), TVP(250), TEXLOC(250), FEXLOC(250),  DELTAP  00003
     1                IPNTRM(2,100),NPNTRS, IOVLAP                       DELTAP  00004
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      COMPLEX          DELPHI,       TVP                                    DELTAP  00005
C                    DEFSL(2,LMODES)                                       DELTAP  00006
      DIMENSION     DEFSL(2,1000)                                          DELTAP  00007
      EQUIVALENCE     (DELPHI(81), DEFSL)                                  DELTAP  00008
C                ARRAYS DELPHI AND DEFSL ARE                              DELTAP  00009
C                EQUIVALENCED TO GIVE A 2 ROW UN-OVERLAPPED SECTION       DELTAP  00010
      DIMENSION TVPX(500), XINITX(2)                                       FTNX1   00051
      COMPLEX XINIT                                                        FTNX1   00052
      EQUIVALENCE (TVP,TVPX),(XINIT,XINITX)                                FTNX1   00053
      COMMON /NWASHES/ IPNTDW(2,100),ENRUS(1275), ENRLS(1275),IOVLAPN      NWASHES 00002
      COMPLEX                          ENRUS,       ENRLS                  NWASHES 00003
      COMMON /SNWASH/ IPNTSD(2,50), ENSUBD(2,600),  IPNTIN,IPNTOT,IPNTLS   SNWASH  00002
C                  IPNTSD(LPNTSD), ENSUBD(2*LSDW)                          SNWASH  00003
      COMPLEX ENSUBD                                                       SNWASH  00004
C           IBOXW(LBXCDW,LBOXC), WHERE LBOXC = LSCHDS/20                   BXCDES  00002
      COMMON /BXCDES/ IBOXW(150,8)                                         BXCDES  00003
C             IBOXW IS USED FOR BOTH WING AND TAIL BOX CODES               BXCDES  00004
C                                                                          NWVPMBX 00033
C            IPNTRM(2,NROWS),IPNTDW(2,NROWS),IPNTSD(2,NSROWS)              NWVPMBX 00034
C                                                                          NWVPMBX 00035
      COMMON /LROT  / LROT                                                 NWVPMBX 00036
      COMMON /CHECKPR/ DPPCPR,GEOCPR,MODCPR,AICCPR,NWSCPR,SMCPR,GAFCPR     CHECKPR 00002
      LOGICAL  DPPCPR, GEOCPR, MODCPR, AICCPR,NWSCPR,  SMCPR, GAFCPR       CHECKPR 00003
      LOGICAL CHECKPR                                                      NWVPMBX 00038
      EQUIVALENCE (CHECKPR,NWSCPR)                                         NWVPMBX 00039
      DIMENSION TITL(3)                                                    NWVPMBX 00040
      DIMENSION PARMW(10),IPARMW(10)                                       NWVPMBX 00041
      EQUIVALENCE (PARMW,IPARMW)                                           NWVPMBX 00042
      LOGICAL MXWRIT, RANDOU, MXRD,MXWRT                                   NWVPMBX 00043
      DATA TVPX   / 500* 6000000000002003777777B /                         FTNX1   00054
      DATA MXWRIT,RANDOU, MXRD,MXWRT / .F.,.F.,.F.,.F. /                   NWVPMBX 00044
      DATA XINITX / 2* 3770400000000000000B /                              FTNX1   00055
C                                                                          NWVPMBX 00047
C                                                                          NWVPMBX 00048
      PSIDIF = PSIT - PSIW                                                 NWVPMBX 00049
      IPNTLS = LPNTSD                                                      NWVPMBX 00050
      LIMDWS = LSDW                                                        NWVPMBX 00051
      LROT = NSUBDV + NSUBCN                                               NWVPMBX 00052
      NTVP  = (MYBSW + MYBST)                                              NWVPMBX 00053
      PARMW(2) = B1                                                        NWVPMBX 00054
      PARMW(3) = XMACH                                                     NWVPMBX 00055
      IPARMW(4) = NMCDES                                                   NWVPMBX 00056
C                                                                          NWVPMBX 00057
C                                                                          NWVPMBX 00058
      REWIND IGEOSC                                                        NWVPMBX 00059
      REWIND MODESC                                                        NWVPMBX 00060
      REWIND IVPSC                                                         NWVPMBX 00061
C                                                                          NWVPMBX 00062
      XKVL = XKVAL(IKVAL)                                                  NWVPMBX 00063
C                                                                          NWVPMBX 00064
C        READ GEOMETRIC INFORMATION                                        NWVPMBX 00065
C           WING BOX CODES                                                 NWVPMBX 00066
      MXARRY = 9HBOX CODES                                                 NWVPMBX 00067
      CALL RDINIT                                                          NWVPMBX 00068
      ITYPE = 5HMIXED                                                      NWVPMBX 00069
      K = LBXCDW                                                           NWVPMBX 00070
      CALL READMX (IGEOSC, MXRD, .F., NFS,NMS,LS, NMR, K, NID,ID, ITYPE,   NWVPMBX 00071
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     1            LRS,  IBOXW,  M,N,  PARM, IRR)                          NAVPMBX 00072
      IF (IRR .NE. 0) GO TO 910                                            NAVPMBX 00073
      MXBBS = M                                                            NAVPMBX 00074
      IF (NSURF .EQ. 1 .OR. COPLAN) GO TO 20                               NAVPMBX 00075
C                                                                          NAVPMBX 00076
C           TAIL BOX CODES                                                 NAVPMBX 00077
      MXARRY = 10HTAIL CODES                                               NAVPMBX 00078
      CALL RDINIT                                                          NAVPMBX 00079
      ITYPE = 5HMIXED                                                      NAVPMBX 00080
      CALL READMX (IGEOSC, MXRD, .F., NFS,NMS,LS, NMR, K, NID,ID, ITYPE,   NAVPMBX 00081
     1            LRS,  IBOXW(MXBBS+1,1), M,N,  PARM, IRR)               NAVPMBX 00082
      IF (IRR .NE. 0) GO TO 910                                            NAVPMBX 00083
      ISUBT = MXBBS + 2 - IXBST                                            NAVPMBX 00084
C           = SUBSCRIPT FOR IBOXW TO GET TAIL CODES                        NAVPMBX 00085
C                                                                          NAVPMBX 00086
   20 CONTINUE                                                             NAVPMBX 00087
      MXARRY   10H    FEXLOC                                               NAVPMBX 00088
      CALL RDINIT                                                          NAVPMBX 00089
      ITYPE = 5HMIXED                                                      NAVPMBX 00090
      CALL READMX(IGEOSC, MXRD,.F., NFS,NMS,LS, NMR, 1, NID,ID, ITYPE,     NAVPMBX 00091
     1    LRS, FEXLOC, M,N, PARM, IRR)                                     NAVPMBX 00092
      IF (IRR .NE. 0) GO TO 910                                            NAVPMBX 00093
C                                                                          NAVPMBX 00094
      MXARRY =10H    TEXLOC                                                NAVPMBX 00095
      CALL RDINIT                                                          NAVPMBX 00096
      ITYPE = 5HMIXED                                                      NAVPMBX 00097
      CALL READMX(IGEOSC, MXRD,.F.,  NFS,NMS,LS, NMR, 1, NID,ID, ITYPE,    NAVPMBX 00098
     1    LRS, TEXLOC, M,N, PARM, IRR)                                     NAVPMBX 00099
      IF (IRR .NE. 0) GO TO 910                                            NAVPMBX 00100
      IF(M .NE. 1) GO TO  930                                              NAVPMBX 00101
C                                                                          NAVPMBX 00102
      IF (PSIW .NE. 0 .AND. DIHW) GO TO 30                                 NAVPMBX 00103
      IF (ISHPLW .NE. 0) GO TO 30                                          NAVPMBX 00104
      IF (NSURF .EQ. 1) GO TO 40                                           NAVPMBX 00105
      IF (CAPL .NE. 0) GO TO 30                                            NAVPMBX 00106
      IF (PSIDIF .NE. 0) GO TO 30                                          NAVPMBX 00107
      IF (PSIT .NE. 0 .AND. DIHT) GO TO 30                                 NAVPMBX 00108
      GO TO 40                                                             NAVPMBX 00109
C                                                                          NAVPMBX 00110
C        READ THE ARRAY OF AIC TABLE OF CONTENTS                           NAVPMBX 00111
   30 CONTINUE                                                             NAVPMBX 00112
      MXARRY = 9HSPAT. TOC                                                 NAVPMBX 00113
      CALL RDINIT                                                          NAVPMBX 00114
      NMS = 2                                                              NAVPMBX 00115
      K = 4                                                                NAVPMBX 00116
      CALL READMX (IGEOSC, MXRD, .F., NFS,NMS,LS, NMR, K, NID,ID, ITYPE,   NAVPMBX 00117
     1            LRS, PAIC, M,N, PARM, IRR )                            NAVPMBX 00118
      IF (IRR .NE. 0) GO TO 910                                            NAVPMBX 00119
      DO 35 I = 1,4                                                        NAVPMBX 00120
      NK(I) = IPARM(I+2)                                                   NAVPMBX 00121
   35 CONTINUE                                                             NAVPMBX 00122
   40 CONTINUE                                                             NAVPMBX 00123
      REWIND IGEOSC                                                        NAVPMBX 00124
C                                                                          NAVPMBX 00125
C        GET POINTER ARRAY FOR MODES                                       NAVPMBX 00126
      CALL RDINIT                                                          NAVPMBX 00127
      ITYPE = 5HMIXED                                                      NAVPMBX 00128
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      CALL READMX(MODESC, MXRD,.F.,  NFS,NMS,LS, NMR, 2, NID,ID, ITYPE,   NWVPMBX 00129
     1    LRS, IPNTRM, M,N, PARM, IRR)                                     NWVPMBX 00130
      IF (IRR .NE. 0) GO TO 912                                            NWVPMBX 00131
      IF (M .NE. 2) GO TO 931                                              NWVPMBX 00132
      NPNTRS = N                                                           NWVPMBX 00133
      IOVLAP = IPARM(3)                                                    NWVPMBX 00134
C         IOVLAP = NUMBER OF ROWS TO ALLOW FOR TAIL OVERLAP (TAIL ONLY)    NWVPMBX 00135
C         NPNTRS = TOTAL NUMBER OF ROWS ON BOTH SURFACES, + 1 .            NWVPMBX 00136
C                  (INCLUDES OVERLAP IF SPATIAL)                           NWVPMBX 00137
C                                                                          NWVPMBX 00138
C         SET UP POINTER ARRAY FOR UNSUBDIVIDED DOWNWASHES                 NWVPMBX 00139
      IP = 1                                                               NWVPMBX 00140
      MYBB = MYBBW                                                         NWVPMBX 00141
      IF (COPLAN) MYBB = MAXO(MYBB,MYBBT)                                  NWVPMBX 00142
      MYBBS = MYBB*NSUBDV                                                  NWVPMBX 00143
      MXBB = MXBBW                                                         NWVPMBX 00144
      IF (COPLAN) MXBB = MXBT                                              NWVPMBX 00145
      CALL POINTR( 1,MXBB,MYBB,  .F., .T., IBOXW,LBXCDW, LPNTDW,1,         NWVPMBX 00146
     1            IP, IPNTDW)                                            NWVPMBX 00147
      MXB = MXBW                                                           NWVPMBX 00148
      IF (COPLAN) MXB = MXBT                                               NWVPMBX 00149
      MYB = MYBW                                                           NWVPMBX 00150
      IF(COPLAN) MYB = MYBT                                                NWVPMBX 00151
      IOVLAPN = 0                                                          NWVPMBX 00152
      IF (NSURF .EQ. 1 .OR. COPLAN) GO TO 50                               NWVPMBX 00153
      MXB = MXBT                                                           NWVPMBX 00154
      IXBUT = (IXBT-IXBW)/NSUBDV + 1                                       NWVPMBX 00155
      IP = MXBBW + 1                                                       NWVPMBX 00156
      IPNT = IPNTDW(1,IP)                                                  NWVPMBX 00157
      CALL POINTR(IXBUT, MXBT-IXBUT+1, MYBBT, .F.,.T., IBOXW(ISUBT,1),    NWVPMBX 00158
     1            LBXCDW,LPNTDW, IPNT, IP, IPNTDW)                       NWVPMBX 00159
      IF (MXBBW .GE. IXBUT) IOVLAPN = MXBBW - IXBUT + 1                    NWVPMBX 00160
   50 CONTINUE                                                             NWVPMBX 00161
C                                                                          NWVPMBX 00162
C         LOOP ON MODE SHAPES                                              NWVPMBX 00163
      DO 500 IMODE = 1,NMODES                                              NWVPMBX 00164
C                                                                          NWVPMBX 00165
C         ZERO OUT THE DOWNWASH AND VELOCITY POTENTIAL ARRAYS              NWVPMBX 00166
      LIM = IPNTDW(1,IP) - 1                                               NWVPMBX 00167
      DO 80 I = 1,LIM                                                      NWVPMBX 00168
      ENGUS(I) = XINIT                                                     NWVPMBX 00169
      ENGLS(I) = XINIT                                                     NWVPMBX 00170
   80 CONTINUE                                                             NWVPMBX 00171
      LIM = IPNTRM(1,NPNTRS) - 1                                           NWVPMBX 00172
      DO 85 I = 1,LIM                                                      NWVPMBX 00173
      DELPHI(I) = (0.,0.)                                                  NWVPMBX 00174
   85 CONTINUE                                                             NWVPMBX 00175
C                                                                          NWVPMBX 00176
C                                                                          NWVPMBX 00177
C         READ IN MODE SHAPE                                               NWVPMBX 00178
      CALL RDINIT                                                          NWVPMBX 00179
      MXARRY = 10HMODE SHAPE                                               NWVPMBX 00180
      ITYPE = 4HREAL                                                       NWVPMBX 00181
      CALL READMX(MODESC, MXRD,.F., NFS,NMS,LS, NMR, 2, NID, ID, ITYPE,    NWVPMBX 00182
     1    LRS, DEFSL,  M,N, PARM, IRR)                                     NWVPMBX 00183
      IF (IRR .NE. 0) GO TO 912                                            NWVPMBX 00184
      IF (M .NE. 2) GO TO 931                                              NWVPMBX 00185
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C                                                                       NWVPMBX 00186
C         COMPUTE DOWNWASHES AND VELOCITY POTENTIALS FOR ONE MODE       NWVPMBX 00187
      CALL VELPOT ( IBOXW,LBXCDW, PKERNL(IPKERN),  PKERNL, .T., DIHW)   NWVPMBX 00188
C         OPTIONAL PRINT OF NORMAL WASHES                               NWVPMBX 00189
      IF ( .NOT. (CHECKPR .OR. PRNW) ) GO TO 90                         NWVPMBX 00190
      IF (NSUBDV .EQ. 1) GO TO 87                                       NWVPMBX 00191
      IF (.NOT. CHECKPR) GO TO 87                                       NWVPMBX 00192
      TITL(1) = 10HEN SUBDIVI                                           NWVPMBX 00193
      TITL(2) = 10HDED, UPPER                                           NWVPMBX 00194
      TITL(3) = 10H, PARTIAL                                            NWVPMBX 00195
      IF (IPNTIN .LT. IPNTOT) GO TO 86                                  NWVPMBX 00196
      CALL PRINTR(TITL,IMODE,ENSUBD,2, 1, IPNTIN-1, MYBBS,IPNTSD)       NWVPMBX 00197
      GO TO 87                                                          NWVPMBX 00198
   86 CONTINUE                                                          NWVPMBX 00199
      CALL PRINTR(TITL,IMODE,ENSUBD,2,IPNTOT,IPNTLS-1,MYBBS,IPNTSD)     NWVPMBX 00200
      CALL PRINTR(TITL,IMODE,ENSUBD,2, 1,   IPNTIN-1, MYBBS,IPNTSD)     NWVPMBX 00201
   87 CONTINUE                                                          NWVPMBX 00202
      TITL(1) = 10HWING UPPER                                           NWVPMBX 00203
      TITL(2) = 10H SURFACE N                                           NWVPMBX 00204
      TITL(3) = 10HORMAL WASH                                           NWVPMBX 00205
      IF (COPLAN) TITL(1) =  10H   WING/TA                              NWVPMBX 00206
      IF (COPLAN) TITL(2) =  10HIL UPPER N                              NWVPMBX 00207
      CALL PRINTR( TITL,IMODE, ENRUS,1, 1,MXBB,MYBB, IPNTDW)            NWVPMBX 00208
      IF (.N. COPLAN) TITL(1) = 10HWING LOWER                           NWVPMBX 00209
      IF (    COPLAN) TITL(2) = 10HIL LOWER N                           NWVPMBX 00210
      CALL PRINTR( TITL,IMODE, ENRLS,1, 1,MXBB,MYBB, IPNTDW)            NWVPMBX 00211
C                                                                       NWVPMBX 00212
   90 CONTINUE                                                          NWVPMBX 00213
      IF (NSURF .EQ. 1 .OR. COPLAN) GO TO 140                           NWVPMBX 00214
C                                                                       NWVPMBX 00215
C         DETERMINE WHICH WING SURFACE CONTRIBUTES TO THE TAIL.         NWVPMBX 00216
      IF (CAPL .GT. 0) GO TO 130                                        NWVPMBX 00217
      IF (CAPL .EQ. 0 .AND. PSIDIF .GT. 0 ) GO TO 130                   NWVPMBX 00218
C         THE LOWER WING SURFACE CONTRIBUTES TO THE TAIL                NWVPMBX 00219
      LIM = IFNTDW(1,MXBBW+1) - 1                                       NWVPMBX 00220
      DO 120 I = 1,LIM                                                  NWVPMBX 00221
      ENRUS(I) = ENRLS(I)                                               NWVPMBX 00222
  120 CONTINUE                                                          NWVPMBX 00223
C                                                                       NWVPMBX 00224
C         COMPUTE THE TAIL NORMAL WASHES AND VELOCITY POTENTIALS        NWVPMBX 00225
  130 CONTINUE                                                          NWVPMBX 00226
      CALL VELPOT ( IBOXW(ISUBT,1),LBXCDW, PKERNL(IPKERN), PKERNL,      NWVPMBX 00227
     1              .F., DIHT)                                          NWVPMBX 00228
C         OPTIONAL PRINT OF NORMAL WASHES                               NWVPMBX 00229
      IF ( .NOT. (CHECKPR .OR. PRNW) ) GO TO 135                        NWVPMBX 00230
      IF (NSUBDV .EQ. 1 .OR. .NOT. CHECKPR) GO TO 133                   NWVPMBX 00231
      TITL(1) = 10HEN SUBDIVI                                           NWVPMBX 00232
      TITL(2) = 10HDED, UPPER                                           NWVPMBX 00233
      TITL(3) = 10H, PARTIAL                                            NWVPMBX 00234
      IF (IPNTIN .LT. IPNTOT) GO TO 131                                 NWVPMBX 00235
      CALL PRINTR(TITL,IMODE,ENSUBD,2, 1, IPNTIN-1, MYBBS,IPNTSD)       NWVPMBX 00236
      GO TO 133                                                         NWVPMBX 00237
  131 CONTINUE                                                          NWVPMBX 00238
      CALL PRINTR(TITL,IMODE,ENSUBD,2,IPNTOT,IPNTLS-1,MYBBS,IPNTSD)     NWVPMBX 00239
      CALL PRINTR(TITL,IMODE,ENSUBD,2, 1,   IPNTIN-1, MYBBS,IPNTSD)     NWVPMBX 00240
  133 CONTINUE                                                          NWVPMBX 00241
      TITL(1) = 10HTAIL UPPER                                           NWVPMBX 00242
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      CALL PRINTR( TITL,IMODE, ENRGS,1, IXBUT,MXBT,MYBBT,                NWVPMBX 00243
     1            IPNTBW(1,IOVLAPN + 1)  )                              NWVPMBX 00244
      TITL(1) = 10HTAIL LOWER                                           NWVPMBX 00245
      CALL PRINTR( TITL,IMODE, ENRLS,1, IXBUT,MXBT,MYBBT,               NWVPMBX 00246
     1            IPNTBW(1,IOVLAPN + 1)  )                              NWVPMBX 00247
  135 CONTINUE                                                          NWVPMBX 00248
C                                                                       NWVPMBX 00249
C         WRITE THE RESULTS ON SCRATCH FILES                            NWVPMBX 00250
  140 CONTINUE                                                          NWVPMBX 00251
      PARMW(1) = XKVL                                                   NWVPMBX 00252
      DO 210 I = 1,4                                                    NWVPMBX 00253
  210 PARM(I) = PARMW(I)                                                NWVPMBX 00254
C                                                                       NWVPMBX 00255
C   XX    WRITE DELTA PHIS, TEMPORARILY AS A REAL MATRIX, WRTETP    XX  NWVPMBX 00256
      M = 2                                                             NWVPMBX 00257
      ITYPE = 4HREAL                                                    NWVPMBX 00258
      N = IPNTRM(1,MXB+IOVLAP+1) - 1                                    NWVPMBX 00259
      CALL WRTEMX(IVPSC, .F., .F., NFS,NMS,LS, NMR,LWS, 2, ID, DELPHI,  NWVPMBX 00260
     1     ITYPE, M,N,PARM, IRR)                                        NWVPMBX 00261
      IF (IRR .NE. 0) GO TO 920                                         NWVPMBX 00262
C                                                                       NWVPMBX 00263
      M = 2                                                             NWVPMBX 00264
      N = NTVP                                                          NWVPMBX 00265
      CALL WRTEMX(IVPSC, .F., .F., NFS,NMS,LS, NMR, LWS,  2, ID, TVP,   NWVPMBX 00266
     1     ITYPE, M,N,PARM, IRR)                                        NWVPMBX 00267
      IF (IRR .NE. 0) GO TO 920                                         NWVPMBX 00268
C                                                                       NWVPMBX 00269
      IF (.NOT. PRVP) GO TO 230                                         NWVPMBX 00270
      TITL(1) = 8H    WING                                              NWVPMBX 00271
      TITL(2) = 10HVELOCITY P                                           NWVPMBX 00272
      TITL(3) = 10HOTENTIALS                                            NWVPMBX 00273
      M = MXBW                                                          NWVPMBX 00274
      IF (.N. COPLAN) GO TO 220                                         NWVPMBX 00275
      TITL(1) = 10HWING/TAIL                                            NWVPMBX 00276
      M = NPNTRS - 1                                                    NWVPMBX 00277
  220 CALL PRINTR( TITL, IMODE, DELPHI,1, 1,M, MYB, IPNTRM)             NWVPMBX 00278
      IF (NSURF .EQ. 1 .OR. COPLAN) GO TO 230                           NWVPMBX 00279
      TITL(1) = 8H    TAIL                                              NWVPMBX 00280
      CALL PRINTR( TITL, IMODE, DELPHI, 1, IXBUT,MXBT, MYBT,            NWVPMBX 00281
     1            IPNTRM(1,IOVLAP+1)  )                                 NWVPMBX 00282
  230 CONTINUE                                                          NWVPMBX 00283
C         ARE SAMPLE WASHES DESIRED -                                   NWVPMBX 00284
      IF (NSURF .EQ. 2 .OR. ISMPLW .EQ. 0) GO TO 500                    NWVPMBX 00285
C         YES.  IS SAMPLE WASH PRINTOUT DESIRED                         NWVPMBX 00286
      IF (.NOT.(PRDW .OR. PRSW) ) GO TO 500                             NWVPMBX 00287
C         LOOP ON CHORDS FOR WHICH SAMPLE-WASH IS DESIRED               NWVPMBX 00288
      DO 300 JCHRD = 1,ISMPLW                                           NWVPMBX 00289
      JT = ICHORD(JCHRD)                                                NWVPMBX 00290
      IFRST = IBOXF(JCHRD)                                              NWVPMBX 00291
      ILAST = IBOXL(JCHRD)                                              NWVPMBX 00292
      CALL SMPLW( IBOXW,LBXCDW,JCHRD,JT,IFRST,ILAST)                    NWVPMBX 00293
  300 CONTINUE                                                          NWVPMBX 00294
C                                                                       NWVPMBX 00295
  500 CONTINUE                                                          NWVPMBX 00296
C         END OF LOOP ON MODE SHAPES, FROM STATEMENT 50*                NWVPMBX 00297
C                                                                       NWVPMBX 00298
      RETURN                                                            NWVPMBX 00299
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C                                                                       NAVPMBX 00300
C         DIAGNOSTICS - ALL CALL FLUSH                                  NAVPMBX 00301
C                                                                       NAVPMBX 00302
C              READING FROM SCRATCH FILE                                NAVPMBX 00303
  910 CONTINUE                                                          NAVPMBX 00304
      WRITE (NT6,9100) IGCOSC                                           NAVPMBX 00305
      GO TO 950                                                         NAVPMBX 00306
  912 CONTINUE                                                          NAVPMBX 00307
      WRITE (NT6,9120) MODESC                                           NAVPMBX 00308
      GO TO 950                                                         NAVPMBX 00309
  920 CONTINUE                                                          NAVPMBX 00310
C              WRITING ON SCRATCH FILE                                  NAVPMBX 00311
      WRITE (NT6,9200) IVPSC                                            NAVPMBX 00312
      GO TO 952                                                         NAVPMBX 00313
C              INCORRECT DIMENSIONS READ                                NAVPMBX 00314
  930 CONTINUE                                                          NAVPMBX 00315
      I = 1                                                             NAVPMBX 00316
      GO TO 932                                                         NAVPMBX 00317
  931 I = 2                                                             NAVPMBX 00318
  932 WRITE (NT6,9300) I                                                NAVPMBX 00319
      IF (MXRD) GO TO 960                                               NAVPMBX 00320
      GO TO 962                                                         NAVPMBX 00321
C              ERROR DETECTED READING A MATRIX                          NAVPMBX 00322
  950 CONTINUE                                                          NAVPMBX 00323
      WRITE (NT6,9500) IRR                                              NAVPMBX 00324
      IF (MXRD) GO TO 960                                               NAVPMBX 00325
      GO TO 962                                                         NAVPMBX 00326
C              ERROR DETECTED WRITING A MATRIX                          NAVPMBX 00327
  952 CONTINUE                                                          NAVPMBX 00328
      WRITE (NT6,9520) IRR                                              NAVPMBX 00329
      IF (MXWRT) GO TO 960                                              NAVPMBX 00330
      WRITE (NT6,9630) MXARRY                                           NAVPMBX 00331
      GO TO 962                                                         NAVPMBX 00332
C              MATRIX DESCRIPTION                                       NAVPMBX 00333
  960 CONTINUE                                                          NAVPMBX 00334
      WRITE (NT6,9600) (ID(I),I=1,10),(ID(I),I=1,10)                    NAVPMBX 00335
      WRITE (NT6,9622)  PARM,PARM                                       NAVPMBX 00336
      WRITE (NT6,9614)  NMR,NMR,LRS,LMS                                 NAVPMBX 00337
      GO TO 964                                                         NAVPMBX 00338
  962 WRITE (NT6,9620) ID(1),ID(2)                                      NAVPMBX 00339
      WRITE (NT6,9622)  PARM,PARM                                       NAVPMBX 00340
      WRITE (NT6,9624)  NFS,NMS                                         NAVPMBX 00341
  964 WRITE (NT6,9640) ITYPE,M,N                                        NAVPMBX 00342
      WRITE (NT6,9630) MXARRY                                           NAVPMBX 00343
      GO TO 990                                                         NAVPMBX 00344
C                                                                       NAVPMBX 00345
  990 CONTINUE                                                          NAVPMBX 00346
      WRITE (NT6,9900)                                                  NAVPMBX 00347
C                                                                       NAVPMBX 00348
      CALL FLUSH(1)                                                     NAVPMBX 00349
C                                                                       NAVPMBX 00350
C              DIAGNOSTIC FORMATS                                       NAVPMBX 00351
 9100 FORMAT(47H0*** ERROR WHILE READING GEOMETRY SCRATCH FILE ,A10,    NAVPMBX 00352
     1   4H *** )                                                       NAVPMBX 00353
 9120 FORMAT(44H0*** ERROR WHILE READING MODES SCRATCH FILE ,A10,       NAVPMBX 00354
     1   4H *** )                                                       NAVPMBX 00355
 9200 FORMAT(51H0*** ERROR WHILE WRITING VELOCITY POTENTIAL SCRATCH     NAVPMBX 00356
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     1    6H FILE ,A10, 4H ***)                                              NAVPMBX 00357
 9300 FORMAT(1HO,   48H*** MATRIX READ ERROR.  THE  M  DIMENSION SHOULD      NAVPMBX 00358
     1   4H BE ,I2, 4H ***)                                                  NAVPMBX 00359
 9500 FORMAT(16HO *** ERROR CODE ,I5, 28H WHILE READING THE FOLLOWING        NAVPMBX 00360
     1  11H MATRIX *** )                                                    NAVPMBX 00361
 9520 FORMAT(16HO *** ERROR CODE ,I5, 28H WHILE WRITING THE FOLLOWING        NAVPMBX 00362
     1  11H MATRIX *** )                                                    NAVPMBX 00363
 9600 FORMAT( 5X,*MATRIX ID = *,10A10 / (20X,10A10)  )                      NAVPMBX 00364
 9614 FORMAT( 5X,22HMATRIX INDEX (NAME) = ,I5,2H (A10,1H) /                 NAVPMBX 00365
     1        5X,33HLEVEL NUMBER READ (OR WRITTEN) = O2,2H (,O2,1H)  )     FTNX1   00056
 9620 FORMAT( 5X,*MATRIX ID = *, A10, I10 )                                 NAVPMBX 00367
 9622 FORMAT( 5X,11HPARAMETERS, 10E11.3 /10X, 9H(INTEGER), I7,9I11)         NAVPMBX 00368
 9624 FORMAT( 5X,15HFILE SPACING = ,I3, 19H, MATRIX SPACING = ,I3 )         NAVPMBX 00369
 9630 FORMAT( 5X,A10,21H ARRAY WAS BEING USED )                             NAVPMBX 00370
 9640 FORMAT( 5X,*MATRIX TYPE - *,A10, *, DIMENSIONED (*I4,* X*,I4,*)*)     NAVPMBX 00371
 9900 FORMAT(54HO*** ERROR OCCURRED DURING VELOCITY POTENTIAL CALCULAT       NAVPMBX 00372
     1    8HIONS *** )                                                      NAVPMBX 00373
C                                                                           NAVPMBX 00374
      END                                                                   NAVPMBX 00375
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      SUBROUTINE VELPOT(IBOX,LBXCD, PKERNL,SKERNL, WING, DIHS)          VELPOT  00002
C                                                                       VELPOT  00003
C       VELPOT IS CALLED ONCE FOR EACH MODE, TO COMPUTE NORMAL WASHES   VELPOT  00004
C       AND VELOCITY POTENTIALS FOR THAT MODE.                          VELPOT  00005
C                                                                       VELPOT  00006
C       IBOX   = BOX CODES FOR THE SURFACE                              VELPOT  00007
C       LBXCD  = BOX CODE ARRAY ROW DIMENSION                           VELPOT  00008
C       PKERNL = ARRAY CONTAINING  C(NU,MU,0)                           VELPOT  00009
C       SKERNL = ARRAY CONTAINING SUBDIVIDED C(NU,MU,0)                 VELPOT  00010
C       WING   = LOGICAL, .T. FOR WING OR COPLANAR, .F. FOR TAIL        VELPOT  00011
C       DIHS   = LOGICAL, .T. TO INCLUDE DIHEDRAL EFFECTS, .F. TO       VELPOT  00012
C                IGNORE, FOR WING/WING (TAIL/TAIL)                      VELPOT  00013
C                                                                       VELPOT  00014
      DIMENSION IBOX(LBXCD,1), ICODE(5)                                 VELPOT  00015
      COMPLEX PKERNL(1), SKERNL(1)                                      VELPOT  00016
      LOGICAL WING,DIHS                                                 VELPOT  00017
C                                                                       VELPOT  00018
C     OUTPUTS -                                                         VELPOT  00019
C       DELPHI = DELTA PHI (VELOCITY POTENTIAL) ARRAY                   VELPOT  00020
C                                                                       VELPOT  00021
C     COMMON PARAMETERS USED                                            VELPOT  00022
C       NSUBDV = NUMBER OF SUBDIVISIONS                                 VELPOT  00023
C       B1     = BOX LENGTH                                             VELPOT  00024
C       B1S    = SUBDIVIDED BOX LENGTH                                  VELPOT  00025
C                                                                       VELPOT  00026
      COMMON /FILES / NT5,NTG,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,         FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC         FILES   00003
      COMMON /ARRAYS/ KBXCDW,LBXCDW,LBOXC,KBXCDT,LBXCDT,KJALPH,LJALPH,  ARRAYS  00002
     1                KALPHA,KKERNL,LKERNL,KPNTRM,LPNTRM,KDEFSL,KELPHI, ARRAYS  00003
     2                LMODES,KPNTSD,LPNTSD,KSDW,LSDW,KPNTDW,LPNTDW,     ARRAYS  00004
     3                KDW,LDW,KTVP,LTVP                                 ARRAYS  00005
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,         GEOMTY  00002
     1                B1,B1BETA,B1S,B1STAS,WLAX,WLAZ,PSIW,              GEOMTY  00003
     2                MYBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,         GEOMTY  00004
     3                IXBW,XCENTR                                       GEOMTY  00005
      LOGICAL COPLAN                                                    GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,MXBT,MYBT,MYBBT,MXBST,MYBST,      GEOM2   00002
     1                MYBBST,IXBT,IXBST,CAFL                            GEOM2   00003
      COMMON / MODES/ SYM,SYMT,MTYPEW,MTYPET                            MODCOM  00002
C                                                                       VELPOT  00032
      COMMON /MUAICS/ YBAR,EL,MUAIC(2,50),NROWS,SURF,                   MUAICS  00002
     1                YBARL,ELL, MUAICL(2,50),NROWSL,SURFL,PSIDIF       MUAICS  00003
      LOGICAL SURF,SURFL                                                MUAICS  00004
      COMMON /AICS  / XKVL,   C(1640),W(1640),V(1640)                   AICS    00002
      COMPLEX                 C,      W,      V                         AICS    00003
C                   DELPHI(LMODES),TVP(LTVP),TEXLOC(LTVP)               DELTAP  00002
      COMMON /DELTAP/ DELPHI(1000), TVP(250), TEXLOC(250), FEXLOC(250), DELTAP  00003
     1                IPNTRM(2,100),NPNTRS, IOVLAP                      DELTAP  00004
      COMPLEX         DELPHI,       TVP                                 DELTAP  00005
C                   DEFSL(2,LMODES)                                     DELTAP  00006
      DIMENSION     DEFSL(2,1000)                                       DELTAP  00007
      EQUIVALENCE    (DELPHI(1),DEFSL)                                  DELTAP  00008
C                 ARRAYS DELPHI AND DEFSL ARE                           DELTAP  00009
C                 EQUIVALENCED TO GIVE A 2 ROW UN-OVERLAPPED SECTION    DELTAP  00010
      COMMON /NWASHES/ IPNTDW(2,100),ENRUS(1275), ENRLS(1275),IOVLAPN   NWASHES  00002
      COMPLEX                        ENRUS,       ENRLS                NWASHES  00003
      COMMON /SNWASH/ IPNTSD(2,50), ENSUBD(2,600),  IPNTIN,IPNTOT,IPNTLS SNWASH  00002
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C                   IPNTSD(LPNTSD), ENSUBD(24LSDW)                    SNWASH  00003
      COMPLEX ENSUBD                                                  SNWASH  00004
C           IBOXW(LBXCDW,LBOXC), WHERE LBOXC = LSCHDS/20              BXCDES  00002
      COMMON /BXCDES/ IBOXW(150,8)                                    BXCDES  00003
C             IBOXW IS USED FOR BOTH WING AND TAIL BOX CODES          BXCDES  00004
      COMMON /CHECKPR/ DPPCPR,GEOCPR,MODCPR,AICCPR,NWSCPR,SMCPR,GAFCPR CHECKPR 00002
      LOGICAL  DPPCPR, GEOCPR, MODCPR, AICCPR,NWSCPR,  SMCPR, GAFCPR  CHECKPR 00003
      EQUIVALENCE (CHECKPR,NWSCPR)                                    VELPOT  00040
      LOGICAL CHECKPR                                                 VELPOT  00041
C                                                                     VELPOT  00042
      COMPLEX   AZERO, DELPH,  DELPHA,DELPHB,DELPHC, B, SDELPH,COEF   VELPOT  00043
      COMPLEX   ENRULU(50),ENRLLL(50),ENRURW(50),ENRULW(50), DPHIL(50) VELPOT  00044
      COMPLEX   ENDIF, ENSUM, ENSRUS,ENSRLS                           VELPOT  00045
      COMPLEX ENSBD(2)                                                VELPOT  00046
      EQUIVALENCE (ENSRUS,ENSBD(1)),  (ENSRLS,ENSBD(2))               VELPOT  00047
C                                                                     VELPOT  00048
      LOGICAL   CROW, FROW, LROW, CBOX, FBOX, LBOX, SUBOFF            VELPOT  00049
      LOGICAL   FULLBX(50)                                            VELPOT  00050
      INTEGER  WW,TT,RWT,LWT                                          VELPOT  00051
      COMPLEX XINIT                                                   FTN01   00057
      DIMENSION XINITX(2)                                             FTN01   00058
      EQUIVALENCE (XINIT,XINITX)                                      FTN01   00059
      DATA  WW,TT,RWT,LWT /1,2,3,4/                                   VELPOT  00052
C        THESE VALUES MAY BE MODIFIED BY ACTUAL PAIC-- ARRAYS READ IN VELPOT  00053
      DATA XINITX / 2* 37704000000000000000B /                        FTN01   00060
C                                                                     VELPOT  00056
C        SET CONSTANTS                                                VELPOT  00057
C        IXB    = SUBDIVIDED SUBSCRIPT OF FIRST PLANFORM CONTROL POINT VELPOT  00058
C        IXBS   = SUBSCRIPT OF FIRST PLANFORM SUBDIVIDED BOX          VELPOT  00059
C        IXBU   = UNSUBDIVIDED SUBSCRIPT OF FIRST PLANFORM CONTROL PT. VELPOT  00060
C        MYBB   = NUMBER OF UNSUBDIVIDED CHORDS TO CONSIDER, INCLUDING VELPOT  00061
C                 DIAPHRAGM                                           VELPOT  00062
C        MYBBS  = NUMBER OF SUBDIVIDED CHORDS TO CONSIDER, INCL. DIAPH. VELPOT  00063
C        MXB    = LAST UNSUBDIVIDED ROW TO CONSIDER                   VELPOT  00064
C        MXBS   = LAST SUBDIVIDED ROW TO CONSIDER (TO LAST CONTROL PNT) VELPOT  00065
      IF (WING) GO TO 80                                              VELPOT  00066
      IOVLP = IOVLAP                                                  VELPOT  00067
      IOVLPN = IOVLAPN                                                VELPOT  00068
      PSIS = PSIT                                                     VELPOT  00069
      IXB  = IXBT                                                     VELPOT  00070
      IXBS = IXBST                                                    VELPOT  00071
      IXBU = (IXBT - IXBW)/NSUBDV + 1                                 VELPOT  00072
      MYBB  = MYBBT                                                   VELPOT  00073
      MYBBS = MYBBST                                                  VELPOT  00074
      SYMTY = SYMT                                                    VELPOT  00075
      GO TO 90                                                        VELPOT  00076
   80 CONTINUE                                                        VELPOT  00077
      IOVLP = 0                                                       VELPOT  00078
      IOVLPN = 0                                                      VELPOT  00079
      PSIS = PSIW                                                     VELPOT  00080
      IXB  = IXBW                                                     VELPOT  00081
      IXBS = 1                                                        VELPOT  00082
      IXBU = 1                                                        VELPOT  00083
      SYMTY = SYM                                                     VELPOT  00084
      IF (COPLAN .AND. NSURF .EQ. 2) GO TO 85                         VELPOT  00085
      MYBB  = MYBBW                                                   VELPOT  00086
      MYBBS = MYBBSW                                                  VELPOT  00087
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      MXB = MXBBW                                                        VELPOT  00088
      MXBS = (MXB-1)*NSUBDV + IXBW                                       VELPOT  00089
      MXBS = MAXO(MXBS,MXBSW)                                            VELPOT  00090
      GO TO 100                                                          VELPOT  00091
   85 CONTINUE                                                           VELPOT  00092
      MYBB  = MAXO(MYBBW,MYBBT)                                          VELPOT  00093
      MYBBS = MAXO(MYBBSW,MYBBST)                                        VELPOT  00094
   90 CONTINUE                                                           VELPOT  00095
      MXB   = MXBT                                                       VELPOT  00096
      MXBS  = MXBST                                                      VELPOT  00097
C                                                                        VELPOT  00098
  100 CONTINUE                                                           VELPOT  00099
      PSIS2 = 2*PSIS                                                     VELPOT  00100
      PSISUM = PSIW + PSIT                                               VELPOT  00101
      CPSIS2 = COS(PSIS2)                                                VELPOT  00102
      SPSIS2 = SIN(PSIS2)                                                VELPOT  00103
      CPSISM = COS(PSISUM)                                               VELPOT  00104
      SPSISM = SIN(PSISUM)                                               VELPOT  00105
      IRFB = IXB - NSUBD2                                                VELPOT  00106
C          =  ROW OF FIRST SUBDIVIDED BOX IN THE FIRST ROW OF THE        VELPOT  00107
C             UNSUBDIVIDED BOXES                                         VELPOT  00108
      MYBBSX = ((MYBBS+NSUBD2)/NSUBDV)*NSUBDV                            VELPOT  00109
      IF (NSUBDV .EQ. 1) GO TO 110                                       VELPOT  00110
      SUBOFF = .F.                                                       VELPOT  00111
      MYBBP1 = MYBB+1                                                    VELPOT  00112
      DO 105 I = 1,MYBBP1                                                VELPOT  00113
      ENRULU(I) = (0.,0.)                                                VELPOT  00114
      ENRLLL(I) = (0.,0.)                                                VELPOT  00115
      ENRURW(I) = (0.,0.)                                                VELPOT  00116
      ENRULW(I) = (0.,0.)                                                VELPOT  00117
      FULLBX(I) = .T.                                                    VELPOT  00118
  105 CONTINUE                                                           VELPOT  00119
      GO TO 120                                                          VELPOT  00120
  110 SUBOFF = .T.                                                       VELPOT  00121
      CROW = .T.                                                         VELPOT  00122
      LROW = .T.                                                         VELPOT  00123
      FBOX = .T.                                                         VELPOT  00124
      CBOX = .T.                                                         VELPOT  00125
      LBOX = .T.                                                         VELPOT  00126
C                                                                        VELPOT  00127
C        LOOP ON ALL (SUBDIVIDED) ROWS OF THE SURFACE                    VELPOT  00128
C                                                                        VELPOT  00129
  120 CONTINUE                                                           VELPOT  00130
      FLIROW = FLOAT(IXBS) - 1.0                                         VELPOT  00131
      DO 1300 IROW = IXBS,MXBS                                           VELPOT  00132
      FLIROW = FLIROW + 1.0                                              VELPOT  00133
C                                                                        VELPOT  00134
C        SET FLAGS FOR FIRST, CENTER AND LAST SUBDIVIDED ROW IN UN-      VELPOT  00135
C        SUBDIVIDED ROW                                                  VELPOT  00136
      IF (SUBOFF) GO TO 270                                              VELPOT  00137
      FROW = .F.                                                         VELPOT  00138
      IF (IROW - IXB) 230,220,210                                        VELPOT  00139
  210 IF (MOD(IROW-IXB, NSUBDV) .NE. 0) GO TO 240                        VELPOT  00140
  220 CROW = .T.                                                         VELPOT  00141
      GO TO 250                                                          VELPOT  00142
  230 CROW = .F.                                                         VELPOT  00143
      IF (IROW .EQ. IXBS .OR. IROW .EQ. IRFB) FROW = .T.                 VELPOT  00144
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      GO TO 250                                                          VELPOT  00145
  240 CROW = .F.                                                         VELPOT  00146
      I = MOD(IROW-NSUBCN - IXB, NSUBDV)                                 VELPOT  00147
      IF (I - 1) 260,245,250                                             VELPOT  00148
  245 FROW = .T.                                                         VELPOT  00149
  250 LROW = .F.                                                         VELPOT  00150
      IF (IROW .NE. MXBS) GO TO 270                                      VELPOT  00151
  260 LROW = .T.                                                         VELPOT  00152
C                                                                        VELPOT  00153
C         GET THE SUBDIVIDED ROW NUMBER FOR THE CENTER OF THE ASSOCIATED VELPOT  00154
C         UNSUBDIVIDED BOX,  ICENT                                       VELPOT  00155
  270 CONTINUE                                                           VELPOT  00156
      IF (CROW) GO TO 340                                                VELPOT  00157
      IF (IROW - IRFB) 310,320,330                                       VELPOT  00158
C         NO FULL ROW                                                    VELPOT  00159
  310 ICENT  = 0                                                         VELPOT  00160
      IUCENT = 0                                                         VELPOT  00161
      NCDCEN = 0                                                         VELPOT  00162
      CBOX   = .F.                                                       VELPOT  00163
      LBOX   = .F.                                                       VELPOT  00164
      GO TO 355                                                          VELPOT  00165
  320 ICENT = IXB                                                        VELPOT  00166
      GO TO 350                                                          VELPOT  00167
  330 ICENT =((IROW-IRFB)/NSUBDV)*NSUBDV + IXB                           VELPOT  00168
      IF (ICENT .GT. MXBS) ICENT = ICENT - NSUBDV                        VELPOT  00169
      GO TO 350                                                          VELPOT  00170
  340 ICENT = IROW                                                       VELPOT  00171
C                                                                        VELPOT  00172
  350 CONTINUE                                                           VELPOT  00173
      IUCENT = (ICENT-IXBW)/NSUBDV + 1                                   VELPOT  00174
  355 CONTINUE                                                           VELPOT  00175
      JEXLOC = 1                                                         VELPOT  00176
      IF (.NOT. WING) JEXLOC = MYBSW + 1                                 VELPOT  00177
C                                                                        VELPOT  00178
C         LOOP ON ALL (SUBDIVIDED) CHORDS FOR THE SURFACE AND DIAPHRAGM  VELPOT  00179
C                                                                        VELPOT  00180
      DO 1200 JCOL = 1,MYBBSX                                            VELPOT  00181
C                                                                        VELPOT  00182
C         GET THE CURRENT (SUBDIVIDED) BOX CODE                          VELPOT  00183
      CALL DCODER(IBOX,LBXCD, IROW,JCOL, IROW,JCOL, .T., NCDBOX)         VELPOT  00184
      IF (SUBOFF) GO TO 480                                              VELPOT  00185
C                                                                        VELPOT  00186
C     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -      VELPOT  00187
C                                                                        VELPOT  00188
C       GET INFORMATION ABOUT POSITION WITHIN UNSUBDIVIDED BOX           VELPOT  00189
C                                                                        VELPOT  00190
C         ICENT  = I-LOCATION (SUBDIVIDED) OF THE CONTROL POINT          VELPOT  00191
C         JCENT  = J-LOCATION (SUBDIVIDED) OF THE CONTROL POINT          VELPOT  00192
C         IUCENT = UNSUBDIVIDED I-LOCATION OF ASSOCIATED CONTROL POINT   VELPOT  00193
C         JUCENT = UNSUBDIVIDED J-LOCATION OF ASSOCIATED CONTROL POINT   VELPOT  00194
C         IPCENT = UNSUBDIVIDED I-LOCATION OF THE NEAREST PLANFORM       VELPOT  00195
C                  CONTROL POINT, IF THE SUBDIVIDED BOX IS ON-PLANFORM   VELPOT  00196
C         CBOX   = .T., CURRENT BOX IS A CENTER BOX                      VELPOT  00197
C         LBOX   = .T., THIS IS THE LAST BOX ASSOCIATED WITH THE CONTROL VELPOT  00198
C                    POINT                                               VELPOT  00199
C         NCDCEN = CODE FOR CONTROL POINT                                VELPOT  00200
C         NCDBOX = CODE FOR THE CURRENT SUBDIVIDED BOX                   VELPOT  00201
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C         IICENT = I-LOCATION (SUBDIVIDED) FOR THE NEAREST PLANFORM      VELPOT  00202
C                  CONTROL POINT                                         VELPOT  00203
C                                                                        VELPOT  00204
      LBOX = .F.                                                         VELPOT  00205
      JUCENT = (JCOL-NSUBCN)/XSUBDV + 1.5                                VELPOT  00206
      JCENT  = NSUBDV * JUCENT - NSUBD2                                  VELPOT  00207
      IF (.NOT. CROW) GO TO 410                                          VELPOT  00208
      IF (JCENT .NE. JCOL) GO TO 410                                     VELPOT  00209
      CBOX = .T.                                                         VELPOT  00210
      NCDCEN = NCDBOX                                                    VELPOT  00211
      IICENT = INOW                                                      VELPOT  00212
      IF (NCDBOX) 450,1100,450                                           VELPOT  00213
C         GET CENTER BOX CODE, NCDCEN                                    VELPOT  00214
  410 CBOX = .F.                                                         VELPOT  00215
      NCDCEN = 0                                                         VELPOT  00216
      IF (ICENT .LE. 0) GO TO 414                                        VELPOT  00217
      CALL DCODER(IBOX,LBXCD, ICENT,JCENT, ICENT,JCENT, .T., NCDCEN)     VELPOT  00218
      IICENT = ICENT                                                     VELPOT  00219
      GO TO 418                                                          VELPOT  00220
  414 IICENT = IXB - NSUBDV                                              VELPOT  00221
C                                                                        VELPOT  00222
  418 CONTINUE                                                           VELPOT  00223
      IF (NCDBOX - 1) 420,424,450                                        VELPOT  00224
C         SUBDIVIDED BOX IS NOT CONSIDERED (CODE = 0).  IF CENTER CODE   VELPOT  00225
C         IS ALSO ZERO, LOOP TO NEXT BOX.  OTHERWISE, CHECK FOR LAST BOX VELPOT  00226
  420 IF (NCDCEN) 450,1100,450                                           VELPOT  00227
C                                                                        VELPOT  00228
C         SUBDIVIDED BOX CODE = 1.  CHECK WHETHER ITS CONTROL PT = 1     VELPOT  00229
  424 CONTINUE                                                           VELPOT  00230
      IF (.NOT. COPLAN) GO TO 431                                        VELPOT  00231
      IF (TEXLOC(JEXLOC) .LT. FLIROW) JEXLOC = JEXLOC + MYBSW            VELPOT  00232
      IF (FEXLOC(JEXLOC) .GT. FLIROW) JEXLOC = JEXLOC - MYBSW            VELPOT  00233
C         DETERMINE WHETHER SUBDIVIDED BOX IS ON SAME PLANFORM AS        VELPOT  00234
C         IICENT  (LOCATION OF NEAREST CONTROL POINT)                    VELPOT  00235
      IF (JEXLOC .EQ. JCOL) GO TO 428                                    VELPOT  00236
C         SUBDIVIDED BOX IS ON THE TAIL.  IS IICENT ON THE WING -        VELPOT  00237
      IF (FLOAT(IICENT) .LE. TEXLOC(JCENT) ) GO TO 432                   VELPOT  00238
C         NO.  CHECK FOR IICENT OFF-PLANFORM.                            VELPOT  00239
      GO TO 431                                                          VELPOT  00240
C         SUBDIVIDED BOX IS ON THE WING.  IS IICENT AFT OF THE WING T.E. VELPOT  00241
  428 IF (FLOAT(IICENT) .GT. TEXLOC(JCENT) ) GO TO 432                   VELPOT  00242
C         NO.  CHECK FOR IICENT OFF- PLANFORM (L.E. DIAPHRAGM)           VELPOT  00243
  431 CONTINUE                                                           VELPOT  00244
C         CHECK CODE AT IICENT (NEAREST CONTROL POINT)                   VELPOT  00245
      IF (NCDCEN .EQ. 1) GO TO 450                                       VELPOT  00246
C         SUBDIVIDED ON-PLANFORM BOX DOES NOT LIE WITHIN AN UNSUBDIVIDED VELPOT  00247
C         BOX WHOSE CONTROL POINT IS ON PLANFORM.  SEARCH FORE AND AFT   VELPOT  00248
C         FOR THE NEAREST CONTROL POINT ON THE SURFACE.                  VELPOT  00249
  432 CONTINUE                                                           VELPOT  00250
      IFCOMR = IFIX(FEXLOC(JEXLOC)) + 1                                  VELPOT  00251
      ILCOMR =      TEXLOC(JEXLOC)                                       VELPOT  00252
      IMAX = 2*NSUBDV                                                    VELPOT  00253
      DO 436 I = NSUBDV,IMAX,NSUBDV                                      VELPOT  00254
      IICENT = ICENT+I                                                   VELPOT  00255
      IF (IICENT .GT. ILCOMR) GO TO 434                                  VELPOT  00256
      CALL DCODER(IBOX,LBXCD, IICENT,JCENT, IICENT,JCENT, .T., NCD)      VELPOT  00257
      IF (NCD .EQ. 1) GO TO 440                                          VELPOT  00258
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  434 CONTINUE                                                          VELPOT 00259
      IICENT = ICENT-I                                                  VELPOT 00260
      IF (IICENT .LT. IFCOMR) GO TO 438                                 VELPOT 00261
      CALL DCODER(IBOX,LBXCD, IICENT,JCENT, IICENT,JCENT, .T., NCD)     VELPOT 00262
      IF (NCD .EQ. 1) GO TO 440                                         VELPOT 00263
  438 CONTINUE                                                          VELPOT 00264
C         NO CENTER BOX FOUND.  A WARNING DIAGNOSTIC WILL BE PRINTED,   VELPOT 00265
C         THEN COMPUTATION WILL CONTINUE AT 420                         VELPOT 00266
      GO TO 3010                                                        VELPOT 00267
C         A BOX WAS FOUND                                               VELPOT 00268
  440 CONTINUE                                                          VELPOT 00269
C                                                                       VELPOT 00270
C         THE ASSOCIATED CONTROL POINT HAS BEEN FOUND.  GET THE UNSUB-  VELPOT 00271
C         DIVIDED SUBSCRIPT.                                            VELPOT 00272
  450 CONTINUE                                                          VELPOT 00273
      IPCENT = (IICENT-IXBW)/NSUBDV + 1                                 VELPOT 00274
      IF (LROW) GO TO 470                                               VELPOT 00275
      IF (.NOT. FROW) GO TO 460                                         VELPOT 00276
      IF (JCOL .NE. JCENT-NSUBD2) GO TO 460                             VELPOT 00277
      FBOX = .T.                                                        VELPOT 00278
      GO TO 500                                                         VELPOT 00279
  460 CONTINUE                                                          VELPOT 00280
      FBOX = .F.                                                        VELPOT 00281
      GO TO 500                                                         VELPOT 00282
  470 CONTINUE                                                          VELPOT 00283
      IF (JCOL .EQ. JCENT+NSUBD2) LBOX = .T.                            VELPOT 00284
      FBOX = .F.                                                        VELPOT 00285
      GO TO 500                                                         VELPOT 00286
C                                                                       VELPOT 00287
C     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -     VELPOT 00288
C                                                                       VELPOT 00289
C         SET UP VALUES FOR AN UNSUBDIVIDED CASE                        VELPOT 00290
C         TEST FOR NON-ZERO BOX CODE -                                  VELPOT 00291
  480 CONTINUE                                                          VELPOT 00292
      IF (NCDBOX .EQ. 0) GO TO 1100                                     VELPOT 00293
      ICENT = IROW                                                      VELPOT 00294
      IICENT = ICENT                                                    VELPOT 00295
      IUCENT = ICENT                                                    VELPOT 00296
      JCENT  = JCOL                                                     VELPOT 00297
      JUCENT = JCOL                                                     VELPOT 00298
      CBOX   = .T.                                                      VELPOT 00299
      LBOX   = .T.                                                      VELPOT 00300
      NCDCEN = NCDBOX                                                   VELPOT 00301
      FBOX   = .T.                                                      VELPOT 00302
      IPCENT = ICENT                                                    VELPOT 00303
C                                                                       VELPOT 00304
  500 CONTINUE                                                          VELPOT 00305
      IF (NCDBOX .GT. 0) GO TO 510                                      VELPOT 00306
      FULLBX(JUCENT) = .F.                                              VELPOT 00307
      IF (LBOX) GO TO 1040                                              VELPOT 00308
      IF (FBOX) GO TO 515                                               VELPOT 00309
      GO TO 1100                                                        VELPOT 00310
C                                                                       VELPOT 00311
C         THE BOX IS TO BE CONSIDERED.  ARE N-HAT TERMS NECESSARY -     VELPOT 00312
  510 CONTINUE                                                          VELPOT 00313
C         ARE N-HAT TERMS ALREADY AVAILABLE -                           VELPOT 00314
      IF (FBOX) GO TO 515                                               VELPOT 00315
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      IF (NCCBOX .NE. 1) GO TO 860                                      VELPOT  00316
      IF (.NOT. WING) GO TO 810                                         VELPOT  00317
      IF (IPCENT .NE. IUCENT) GO TO 830                                 VELPOT  00318
      GO TO 850                                                         VELPOT  00319
C                                                                       VELPOT  00320
C     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -       VELPOT  00321
C                                                                       VELPOT  00322
C         COMPUTE N-HAT TERMS FOR THIS (UNSUBDIVIDED) BOX               VELPOT  00323
C                                                                       VELPOT  00324
  515 CONTINUE                                                          VELPOT  00325
      ENRULU(JUCENT) = (0.,0.)                                          VELPOT  00326
      ENRLLL(JUCENT) = (0.,0.)                                          VELPOT  00327
      DPHIL(JUCENT) = (0.,0.)                                           VELPOT  00328
C         ARE LEFT SURFACE CONTRIBUTIONS POSSIBLE -                     VELPOT  00329
      IF (IUCENT-IXBU .LT. JUCENT) GO TO 600                            VELPOT  00330
      IF (PSIS .EQ. 0 .OR. .NOT. DIHS) GO TO 600                        VELPOT  00331
C         GET AIC ARRAYS W AND V FOR LEFT SURFACE INFLUENCE ON RT SURFACE VELPOT  00332
      CALL GETAIC(JUCENT,WW, 0, IR)                                     VELPOT  00333
      IF (IR .NE. 0) GO TO 600                                          VELPOT  00334
      NUBMIN = JUCENT                                                   VELPOT  00335
      NUBMAX = IUCENT - IXBU                                            VELPOT  00336
      I = IUCENT - JUCENT                                               VELPOT  00337
      YMUBAR = COS(2*PSIS)* (JUCENT-.5)                                 VELPOT  00338
      JBAR   = YMUBAR + 1                                               VELPOT  00339
C         GET REFERENCE LOCATION IN AIC ARRAYS                          VELPOT  00340
      IF (YBAR) 520,525,530                                             VELPOT  00341
  520 JINCR = 1                                                         VELPOT  00342
      GO TO 535                                                         VELPOT  00343
  525 IAIC = NUBMIN**2                                                  VELPOT  00344
      INCAIC = 2*NUBMIN + 1                                             VELPOT  00345
      JINCR = -1                                                        VELPOT  00346
      GO TO 540                                                         VELPOT  00347
  530 JINCR = -1                                                        VELPOT  00348
  535 IAIC = NUBMIN**2 + NUBMIN                                         VELPOT  00349
      INCAIC = 2*NUBMIN + 2                                             VELPOT  00350
C                                                                       VELPOT  00351
C         LOOP FORWARD OF BOX FOR WING/WING (TAIL/TAIL) N-HAT TERMS     VELPOT  00352
  540 CONTINUE                                                          VELPOT  00353
      DO 590 NUBAR = NUBMIN,NUBMAX                                      VELPOT  00354
      MUAIC1 = MUAIC(1,NUBAR+1)                                         VELPOT  00355
      MUAIC2 = MUAIC(2,NUBAR+1)                                         VELPOT  00356
      IF (MUAIC2 .EQ. 0) GO TO 585                                      VELPOT  00357
      IF (YBAR .GE. 0) GO TO 550                                        VELPOT  00358
      JCOLL = -JBAR - NUBAR + MUAIC1                                    VELPOT  00359
      GO TO 560                                                         VELPOT  00360
  550 JCOLL = -JBAR + NUBAR - MUAIC1 + 2                                VELPOT  00361
  560 CONTINUE                                                          VELPOT  00362
C                                                                       VELPOT  00363
C         LOOP LEFT OF RECEIVING CHORD TO GET LEFT SURFACE CONTRIBUTIONS VELPOT  00364
      DO 580 MUAI = MUAIC1,MUAIC2                                       VELPOT  00365
      IF (JCOLL .LE. 0) GO TO 570                                       VELPOT  00366
      CALL DCODER(IBOX,LBXCD, I,JCOLL, I,JCOLL, .F., ICD)               VELPOT  00367
      IF (ICD .EQ. 0) GO TO 570                                         VELPOT  00368
C         A CONTRIBUTING BOX HAS BEEN FOUND.  GET THE AIC LOCATION      VELPOT  00369
      KAIC = IAIC + MUAI                                                VELPOT  00370
C         GET LOCATION IN N  ARRAYS FOR THE VALUES AT BOX (I,JCOLL)     VELPOT  00371
      IDS = LOCSDW(I,JCOLL, IPNTDW,LPNTDW, 1, LPNTDW)                   VELPOT  00372
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C                                                                       VELPOT  00373
      COEF =  ( CPSIS2*W(KAIC) - SPSIS2*V(KAIC) ) * SYMTY               VELPOT  00374
      ENRULU(JUCENT) = ENRUS(IDS)*COEF + ENRULU(JUCENT)                 VELPOT  00375
      ENRLLL(JUCENT) =-ENRLS(IDS)*COEF + ENRLLL(JUCENT)                 VELPOT  00376
      DPHIL(JUCENT) = (ENRUS(IDS) - ENRLS(IDS) ) * C(KAIC) * SYMTY +    VELPOT  00377
     1                DPHIL(JUCENT)                                      VELPOT  00378
  570 CONTINUE                                                          VELPOT  00379
C                                                                       VELPOT  00380
      JCOLL = JCOLL + JINCR                                             VELPOT  00381
  580 CONTINUE                                                          VELPOT  00382
C         END OF LOOP FOR LEFT ROW CONTRIBUTIONS                        VELPOT  00383
C                                                                       VELPOT  00384
  585 CONTINUE                                                          VELPOT  00385
      I = I - 1                                                         VELPOT  00386
      IF (I .LT. IXBU) GO TO 600                                        VELPOT  00387
      IAIC = INCAIC + IAIC                                              VELPOT  00388
      INCAIC = INCAIC + 2                                               VELPOT  00389
  590 CONTINUE                                                          VELPOT  00390
C         END OF LOOP FORWARD ON ROWS, TO COMPUTE LEFT SURFACE OUT-OF-  VELPOT  00391
C         PLANE EFFECTS, FROM 540                                       VELPOT  00392
C                                                                       VELPOT  00393
C         IF THIS IS AN ON-PLANFORM TAIL BOX, THERE ARE WING-TAIL       VELPOT  00394
C         CONTRIBUTIONS                                                 VELPOT  00395
  600 CONTINUE                                                          VELPOT  00396
      IF (WING) GO TO 830                                               VELPOT  00397
      ENRURW(JUCENT) = (0.,0.)                                          VELPOT  00398
      ENRULW(JUCENT) = (0.,0.)                                          VELPOT  00399
      IF (NCUCEN .NE. 1) GO TO 860                                      VELPOT  00400
C                                                                       VELPOT  00401
C         COMPUTE THE RIGHT WING CONTRIBUTION TO THE TAIL BOX           VELPOT  00402
      II = 1                                                            VELPOT  00403
      IF (PSIW .EQ. PSIT) II = 2                                        VELPOT  00404
      CALL GETAIC(JUCENT,RWT, II, IR)                                   VELPOT  00405
      IF (IR .NE. 0) GO TO 700                                          VELPOT  00406
      NUBMIN =  ABS(EL) + .5                                            VELPOT  00407
      NUBMAX = IUCENT - 1                                               VELPOT  00408
      I = IUCENT - NUBMIN                                               VELPOT  00409
      YMUBAR = (JUCENT - .5) * COS(PSIDIF) + CAPL * SIN(PSIW)           VELPOT  00410
      JBAR  = YMUBAR                                                    VELPOT  00411
      IF (YMUBAR .GE. 0) JBAR = JBAR + 1                                VELPOT  00412
      IF (YBAR) 620,625,630                                             VELPOT  00413
  620 JINCR = -1                                                        VELPOT  00414
      GO TO 635                                                         VELPOT  00415
  625 IAIC = NUBMIN**2                                                  VELPOT  00416
      INCAIC = 2*NUBMIN + 1                                             VELPOT  00417
      JINCR = 1                                                         VELPOT  00418
      GO TO 640                                                         VELPOT  00419
  630 JINCR = 1                                                         VELPOT  00420
  635 IAIC = NUBMIN**2 + NUBMIN                                         VELPOT  00421
      INCAIC = 2*NUBMIN + 2                                             VELPOT  00422
  640 CONTINUE                                                          VELPOT  00423
C                                                                       VELPOT  00424
C         LOOP FORWARD OVER THE RIGHT WING                              VELPOT  00425
      DO 690 NUBAR = NUBMIN,NUBMAX                                      VELPOT  00426
      MUAIC1 = MUAIC(1,NUBAR+1)                                         VELPOT  00427
      MUAIC2 = MUAIC(2,NUBAR+1)                                         VELPOT  00428
      IF (MUAIC2 .EQ. 0) GO TO 685                                      VELPOT  00429
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      IF (YBAR .GE. 0) GO TO 650                                        VELPOT 00430
      JCOLR = JBAR + NUBAR - MUAIC2 + 1                                 VELPOT 00431
      GO TO 660                                                         VELPOT 00432
  650 JCOLR =JBAR - NUBAR + MUAIC1 - 1                                  VELPOT 00433
  660 CONTINUE                                                          VELPOT 00434
C                                                                       VELPOT 00435
C         LOOP ON A ROW OF WING BOXES, COMPUTING RIGHT HAND WING-TAIL    VELPOT 00436
C         CONTRIBUTIONS                                                 VELPOT 00437
      DO 680 MUAI = MUAIC1,MUAIC2                                       VELPOT 00438
      IF (JCOLR .LE. 0) GO TO 670                                       VELPOT 00439
      CALL DCODER(IBOXW,LBXCDW, I,JCOLR, I,JCOLR, .F., ICD)             VELPOT 00440
      IF (ICD .EQ. 0)   GO TO 670                                       VELPOT 00441
C         A CONTRIBUTING BOX HAS BEEN FOUND. GET THE AIC LOCATION       VELPOT 00442
      KAIC = IAIC + MUAI                                                VELPOT 00443
C         GET THE NORMAL-WASH LOCATION                                  VELPOT 00444
      IDS  = LOCSDW( I, JCOLR,  IPNTDW,LPNTDW, 1, LPNTDW)               VELPOT 00445
C         ADD THIS CONTRIBUTION TO  N-HAT                               VELPOT 00446
      IF (II .EQ. 2) GO TO 665                                          VELPOT 00447
      ENRURW(JUCENT) = (COS(PSIDIF)*W(KAIC) - SIN(PSIDIF)*V(KAIC))      VELPOT 00448
     1                 * ENRUS(IDS)  +  ENRURW(JUCENT)                  VELPOT 00449
      GO TO 670                                                         VELPOT 00450
  665 CONTINUE                                                          VELPOT 00451
      ENRURW(JUCENT) =   COS(PSIDIF)*W(KAIC) * ENRUS(IDS) +             VELPOT 00452
     1                  ENRURW(JUCENT)                                  VELPOT 00453
  670 CONTINUE                                                          VELPOT 00454
      JCOLR = JCOLR + JINCR                                             VELPOT 00455
  680 CONTINUE                                                          VELPOT 00456
C         END OF LOOP FOR RIGHT WING ROW CONTRIBUTIONS                  VELPOT 00457
C                                                                       VELPOT 00458
  695 CONTINUE                                                          VELPOT 00459
      I = I - 1                                                         VELPOT 00460
      IF (I .LE. 0) GO TO 700                                           VELPOT 00461
      IAIC = IAIC + INCAIC                                              VELPOT 00462
      INCAIC = INCAIC + 2                                               VELPOT 00463
  690 CONTINUE                                                          VELPOT 00464
C         END OF LOOP FORWARD ON ROWS TO COMPUTE RIGHT WING OUT-OF-     VELPOT 00465
C         PLANE EFFECTS ON THE TAIL,  FROM 640                          VELPOT 00466
C                                                                       VELPOT 00467
C         DETERMINE WHETHER LEFT WING INFLUENCE IS TO BE COMPUTED       VELPOT 00468
  700 CONTINUE                                                          VELPOT 00469
      IF (SYM .EQ. 0) GO TO 800                                         VELPOT 00470
C         GET AIC ARRAYS W AND V FOR LEFT WING INFLUENCE ON TAIL         VELPOT 00471
      II = 1                                                            VELPOT 00472
      IF ( -PSIW .EQ. PSIT) II = 2                                      VELPOT 00473
      CALL GETAIC(JUCENT, LWT, II, IR)                                  VELPOT 00474
      IF (IR .NE. 0) GO TO 800                                          VELPOT 00475
      NUBMIN = ABS(EL) + .5                                             VELPOT 00476
      NUBMAX = IUCENT - 1                                               VELPOT 00477
      I = IUCENT - NUBMIN                                               VELPOT 00478
      YMUBAR = - COS(PSIW + PSIT)*(JUCENT-.5)  +  CAPL*SIN(PSIW)        VELPOT 00479
      JBAR = YMUBAR                                                     VELPOT 00480
      IF (YMUBAR .GE. 0) JBAR = JBAR + 1                                VELPOT 00481
      IF (VBAR) 720,725,730                                             VELPOT 00482
  720 JINCR = 1                                                         VELPOT 00483
      GO TO 735                                                         VELPOT 00484
  725 IAIC = NUBMIN**2                                                  VELPOT 00485
      INCAIC = 2*NUBMIN + 1                                             VELPOT 00486
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      JINCR  = -1                                                        VELPOT  00487
      GO TO 740                                                          VELPOT  00488
  730 JINCR  = -1                                                        VELPOT  00489
  735 IAIC = NUBMIN**2 + NUBMIN                                          VELPOT  00490
      INCAIC = 2*NUBMIN + 2                                              VELPOT  00491
  740 CONTINUE                                                           VELPOT  00492
C                                                                        VELPOT  00493
C         LOOP FORWARD TO GET LEFT WING CONTRIBUTION TO THE TAIL         VELPOT  00494
      IF (SYM .EQ. 0) GO TO 800                                          VELPOT  00495
      DO 790 NUBAR = NUBMIN,NUBMAX                                       VELPOT  00496
      MUAIC1 = MUAIC(1,NUBAR+1)                                          VELPOT  00497
      MUAIC2 = MUAIC(2,NUBAR+1)                                          VELPOT  00498
      IF (MUAIC2 .LE. 0) GO TO 785                                       VELPOT  00499
      IF (YBAR .GE. 0) GO TO 750                                         VELPOT  00500
      JCOLL =  JBAR - NUBAR + MUAIC1 - 1                                 VELPOT  00501
      GO TO 760                                                          VELPOT  00502
  750 JCOLL =  JBAR + NUBAR - MUAIC1 + 1                                 VELPOT  00503
  760 CONTINUE                                                           VELPOT  00504
C                                                                        VELPOT  00505
C         LOOP ON LEFT WING ROW TO GET LEFT WING CONTRIBUTION TO TAIL     VELPOT  00506
      DO 780 MUAI = MUAIC1,MUAIC2                                        VELPOT  00507
      IF (JCOLL .LE. 0) GO TO 770                                        VELPOT  00508
      CALL DCODER(IBOXW,LBXCDW, I,JCOLL, I-JCOLL, .F., ICD)              VELPOT  00509
      IF (ICD .EQ. 0) GO TO 770                                          VELPOT  00510
C         A CONTRIBUTING BOX HAS BEEN FOUND.  GET THE AIC LOCATION       VELPOT  00511
      KAIC = IAIC + MUAI                                                 VELPOT  00512
C         GET THE NORMAL WASH LOCATION                                   VELPOT  00513
      IDS = LOCSDW( I, JCOLL, IPNTDW, LPNTDW, 1, LPNTDW)                 VELPOT  00514
C         ADD THIS CONTRIBUTION TO N-HAT                                 VELPOT  00515
      IF (II .EQ. 2) GO TO 765                                           VELPOT  00516
      ENRULW(JUCENT) = (CPSISM*W(KAIC) - SPSISM*V(KAIC) )                VELPOT  00517
     1                 * ENRUS(IDS)  +  ENRULW(JUCENT)                   VELPOT  00518
      GO TO 770                                                          VELPOT  00519
  765 CONTINUE                                                           VELPOT  00520
       ENRULW(JUCENT) =  CPSISM*W(KAIC) * ENRUS(IDS)  +  ENRULW(JUCENT)  VELPOT  00521
  770 CONTINUE                                                           VELPOT  00522
      JCOLL = JCOLL + JINCR                                              VELPOT  00523
  780 CONTINUE                                                           VELPOT  00524
C         END OF LOOP FOR LEFT WING ROW CONTRIBUTIONS                    VELPOT  00525
C                                                                        VELPOT  00526
  785 CONTINUE                                                           VELPOT  00527
      I = I-1                                                            VELPOT  00528
      IF (I .LE. 0) GO TO 800                                            VELPOT  00529
      IAIC = IAIC + INCAIC                                               VELPOT  00530
      INCAIC = INCAIC + 2                                                VELPOT  00531
  790 CONTINUE                                                           VELPOT  00532
C         END OF LOOP FORWARD ON ROWS, TO COMPUTE LEFT WING OUT-OF-PLANE VELPOT  00533
C         EFFECTS ON THE TAIL,  FROM 740                                 VELPOT  00534
C                                                                        VELPOT  00535
      IF (SYM .LT. 0)  ENRULW(JUCENT) = - ENRULW(JUCENT)                 VELPOT  00536
  800 CONTINUE                                                           VELPOT  00537
C                                                                        VELPOT  00538
C     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -    VELPOT  00539
C                                                                        VELPOT  00540
C         COMPUTE THE UNSUBDIVIDED NORMAL WASH VALUES, IF THE BOX IS ON- VELPOT  00541
C         PLANFORM.  IF NOT, GET THE VALUE FROM THE INTERFERENCE TERMS   VELPOT  00542
C         AND THE CONDITION THAT DELTA-PHI = 0 ON ANY DIAPHRAGM, MODIFI- VELPOT  00543
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C         ED BY WAKE EFFECTS WHERE APPLICABLE.                                  VELPOT  00544
C                                                                               VELPOT  00545
C              - TAIL -                                                         VELPOT  00546
  810 CONTINUE                                                                  VELPOT  00547
      IF (NCDBOX .NE. 1) GO TO 860                                              VELPOT  00548
C         GET DEFLECTION AND SLOPE OF UNSUBDIVIDED TAIL BOX CENTER              VELPOT  00549
      IDS = LOCSDW(IPCENT+IOVLP, JUCENT,IPNTRM, LMODES,1,LMODES)                VELPOT  00550
      DFL = DEFSL(1,IDS)                                                        VELPOT  00551
      SLP = DEFSL(2,IDS)                                                        VELPOT  00552
C         COMPUTE TAIL NORMAL WASH VALUES                                       VELPOT  00553
      ENDIF = 2.0*( CMPLX(B1*SLP, XKVL*DFL) - ENRUW(JUCENT)                     VELPOT  00554
     1             - ENRULW(JUCENT) )  + ENRLLL(JUCENT) -ENRULU(JUCENT)       VELPOT  00555
      ENSUM = - (ENRLLL(JUCENT) + ENRULU(JUCENT) )                              VELPOT  00556
C                                                                               VELPOT  00557
      IF (NCDCEN .NE. 1) GO TO 852                                              VELPOT  00558
      LOCNW = LOCSDW(IUCENT+IOVLPN, JUCENT, IPNTDW, LPNTDW,1,LPNTDW)            VELPOT  00559
      ENRUS(LOCNW) =  0.5*(ENSUM + ENDIF)                                       VELPOT  00560
      ENRLS(LOCNW) =  0.5*(ENSUM - ENDIF)                                       VELPOT  00561
      GO TO 850                                                                 VELPOT  00562
C                                                                               VELPOT  00563
C              - WING -                                                         VELPOT  00564
  830 CONTINUE                                                                  VELPOT  00565
      IF (NCDBOX .NE. 1) GO TO 860                                              VELPOT  00566
C         GET DEFLECTION AND SLOPE OF UNSUBDIVIDED WING BOX CENTER              VELPOT  00567
      IDS = LOCSDW(IPCENT,JUCENT, IPNTRM, LMODES,1,LMODES)                      VELPOT  00568
      DFL = DEFSL(1,IDS)                                                        VELPOT  00569
      SLP = DEFSL(2,IDS)                                                        VELPOT  00570
C         COMPUTE WING NORMAL WASH VALUES                                       VELPOT  00571
      ENSUM = -ENRULU(JUCENT) - ENRLLL(JUCENT)                                  VELPOT  00572
      ENDIF = ENSUM + (CMPLX(B1*SLP, XKVL*DFL) + ENRLLL(JUCENT)) * 2.0          VELPOT  00573
C                                                                               VELPOT  00574
      IF (IPCENT .NE. IUCENT) GO TO 852                                         VELPOT  00575
      LOCNW = LOCSDW(IUCENT,JUCENT, IPNTDW, LPNTDW, 1, LPNTDW)                  VELPOT  00576
      ENRUS(LOCNW) =  (ENSUM + ENDIF) * 0.5                                     VELPOT  00577
      ENRLS(LOCNW) =  (ENSUM - ENDIF) * 0.5                                     VELPOT  00578
C                                                                               VELPOT  00579
C         NORMAL-WASH IS AVAILABLE IF THE BOX IS ON-PLANFORM                    VELPOT  00580
  850 CONTINUE                                                                  VELPOT  00581
      IF (.N. FBOX) LOCNW = LOCSDW(IUCENT+IOVLPN, JUCENT, IPNTDW,LPNTDW,       VELPOT  00582
     1     1,LPNTDW)                                                          VELPOT  00583
      IF (SUBOFF) GO TO 855                                                     VELPOT  00584
C         GET THE SUBDIVIDED VALUE FOR THE NORMAL WASH TERMS                    VELPOT  00585
      DELPHA = ENRUS(LOCNW)                                                     VELPOT  00586
      IF (DELPHA .EQ. XINIT) GO TO 830                                          VELPOT  00587
      DELPHB = ENRLS(LOCNW)                                                     VELPOT  00588
      GO TO 854                                                                 VELPOT  00589
C         THE NEXT 2 STATEMENTS ARE ONLY HIT FOR A SUBDIVIDED PLANFORM          VELPOT  00590
C         BOX WITH NO ASSOCIATED PLANFORM CONTROL POINT                         VELPOT  00591
  852 CONTINUE                                                                  VELPOT  00592
      FULLBX(JUCENT) = .FALSE.                                                  VELPOT  00593
      DELPHA = (ENSUM + ENDIF) * 0.5                                            VELPOT  00594
      DELPHB = (ENSUM - ENDIF) * 0.5                                            VELPOT  00595
  854 CONTINUE                                                                  VELPOT  00596
      ENSRUS = CMPLX( REAL(DELPHA)/XSUBDV,  AIMAG(DELPHA)/XSUBDV +              VELPOT  00597
     1              XKVL*(IROW-IICENT)*REAL(DELPHA) )                          VELPOT  00598
      ENSRLS = CMPLX( REAL(DELPHB)/XSUBDV,  AIMAG(DELPHB)/XSUBDV +              VELPOT  00599
     1              XKVL*(IROW-IICENT)*REAL(DELPHB) )                          VELPOT  00600
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      IF (CBOX) GO TO 870                                                VELPOT 00601
      GO TO 1030                                                         VELPOT 00602
  855 CONTINUE                                                           VELPOT 00603
      ENSRUS = ENRUS(LOCNW)                                              VELPOT 00604
      ENSRLS = ENRLS(LOCNW)                                              VELPOT 00605
      GO TO 870                                                          VELPOT 00606
  860 CONTINUE                                                           VELPOT 00607
      FULLBX(JUCENT) = .F.                                               VELPOT 00608
C                                                                        VELPOT 00609
C     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -      VELPOT 00610
C                                                                        VELPOT 00611
C         DETERMINE THE VELOCITY POTENTIAL CONTRIBUTIONS FROM            VELPOT 00612
C         BOXES LYING  A H E A D  OF THE CURRENT BOX                     VELPOT 00613
C                                                                        VELPOT 00614
  870 CONTINUE                                                           VELPOT 00615
      IF (PSIS .NE. 0 .AND. DIHS) GO TO 880                              VELPOT 00616
C         THE SURFACE IS PLANAR.  GET FULL SURFACE CONTRIBUTIONS         VELPOT 00617
      DELPH = B(IROW,JCOL, PKERNL,SKERNL, IBOX,LBXCD, WING, .F. )        VELPOT 00618
      GO TO 890                                                          VELPOT 00619
C                                                                        VELPOT 00620
C         DIHEDRAL ANGLE IS TO BE ACCOUNTED FOR.  GET THE PLANAR         VELPOT 00621
C         (SUBDIVIDED) CONTRIBUTION OF THE RIGHT SURFACE                 VELPOT 00622
  880 CONTINUE                                                           VELPOT 00623
      DELPH = B(IROW,JCOL, PKERNL,SKERNL, IBOX,LBXCD, WING, .T. )        VELPOT 00624
C         ADD THE SPATIAL LEFT SURFACE CONTRIBUTIONS                     VELPOT 00625
      DELPH = DELPH + DPHIL(JUCENT)                                      VELPOT 00626
  890 CONTINUE                                                           VELPOT 00627
      IF (NCDBOX - 2) 910,1000,980                                       VELPOT 00628
C                                                                        VELPOT 00629
C     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -      VELPOT 00630
C                                                                        VELPOT 00631
C         THE BOX IS ON-PLANFORM, CENTER.  COMPLETE THE CALCULATION OF   VELPOT 00632
C         THE VELOCITY POTENTIAL                                         VELPOT 00633
C                                                                        VELPOT 00634
  910 CONTINUE                                                           VELPOT 00635
      IDS  = LOCSDW(IUCENT+IOVLP,  JUCENT, IPNTRM,LMODES, 1, LMODES)     VELPOT 00636
      IF (SUBOFF) GO TO 915                                              VELPOT 00637
      DELPHI(IDS)  = (ENSRUS-ENSRLS) * SKERNL(1) + DELPH                 VELPOT 00638
      GO TO 920                                                          VELPOT 00639
  915 CONTINUE                                                           VELPOT 00640
      DELPHI(IDS)  = (ENSRUS-ENSRLS) * PKERNL(1) + DELPH                 VELPOT 00641
  920 CONTINUE                                                           VELPOT 00642
C                                                                        VELPOT 00643
C         COMPUTE ANY TRAILING EDGE VELOCITY POTENTIALS ASSOCIATED       VELPOT 00644
C         WITH THIS UNSUBDIVIDED BOX                                     VELPOT 00645
C                                                                        VELPOT 00646
C         IS THIS A TRAILING EDGE BOX -                                  VELPOT 00647
      IF (.NOT. COPLAN) GO TO 930                                        VELPOT 00648
      IF (TEXLOC(JEXLOC) .LT. FLIROW) JEXLOC = JEXLOC + MYBSW            VELPOT 00649
      IF (TEXLOC(JEXLOC) .GT. FLIROW) JEXLOC = JEXLOC - MYBSW            VELPOT 00650
  930 CONTINUE                                                           VELPOT 00651
      JJ = JEXLOC - NSUBDV                                               VELPOT 00652
      TEXMIN = TEXLOC(JJ)                                                VELPOT 00653
      IF (NSUBDV .EQ. 1) GO TO 935                                       VELPOT 00654
      DO 932 J = 2,NSUBDV                                                VELPOT 00655
      JJ = JJ + 1                                                        VELPOT 00656
      TEXMIN = AMIN1(TEXMIN,TEXLOC(JJ))                                  VELPOT 00657
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  932 CONTINUE                                                          VELPOT  00658
  933 IF ( TEXMIN .GE. FLIROW + XSUBDV) GO TO 1030                      VELPOT  00659
C         YES.  GET THE BASIC VELOCITY POTENTIAL                        VELPOT  00660
      DELPHB = DELPHI(IDS)                                              VELPOT  00661
C         TEST UNSUBDIVIDED BOX AHEAD OF CURRENT ONE -                  VELPOT  00662
      CALL DCODER(IBOX,LBXCD, IROW-NSUBDV,JCOL, IROW-NSUBDV,JCOL,       VELPOT  00663
     1            .T.,  NCDA)                                           VELPOT  00664
      IF (NCDA .NE. 1) GO TO 940                                        VELPOT  00665
C         IT IS ON PLANFORM.  TEST FOR TIP CHORD -                      VELPOT  00666
      IF ( JEXLOC .EQ. JCOL .AND. JUCENT .LT. MYBW) GO TO 950           VELPOT  00667
      IF ( JEXLOC .GT. JCOL .AND. JUCENT .LT. MYBT) GO TO 950           VELPOT  00668
C         BOX IS ON THE TIP CHORD.  CHECK FOR THIRD TIP BOX -           VELPOT  00669
      IR = IROW - 2*NSUBDV                                              VELPOT  00670
      IF ( IR  .LT. IXB) GO TO 940                                      VELPOT  00671
      CALL DCODER(IBOX,LBXCD, IR, JCOL,  IR,JCOL, .T., NCDC)            VELPOT  00672
      IF (NCDC .EQ. 1) GO TO 950                                        VELPOT  00673
C         TRY MACH RAY EXTRAPOLATION.  ARE THE 2 RAY BOXES ON-PLANFORM - VELPOT  00674
  940 CONTINUE                                                          VELPOT  00675
      JC = JCOL - NSUBDV                                                VELPOT  00676
      CALL DCODER(IBOX,LBXCD, IROW,JC, IROW,JC, .T., NCDD)              VELPOT  00677
      IF (NCDD .NE. 1) GO TO 945                                        VELPOT  00678
      JC = JC - NSUBDV                                                  VELPOT  00679
      CALL DCODER(IBOX,LBXCD, IROW-NSUBDV,JC, IROW-NSUBDV,JC, .T.,NCDD) VELPOT  00680
      IF (NCDD .NE. 1) GO TO 945                                        VELPOT  00681
C                                                                       VELPOT  00682
C         MACH RAY EXTRAPOLATION, FOLLOWED BY CHORDWISE LINEAR EXTRA-   VELPOT  00683
C              POLATION                                                 VELPOT  00684
      IDPHM2 = LOCSDW( IUCENT-1+IOVLP,JUCENT-2, IPNTRM,LMODES,1,LMODES) VELPOT  00685
      IDPHM1 = LOCSDW( IUCENT+IOVLP,  JUCENT-1, IPNTRM,LMODES,1,LMODES) VELPOT  00686
      DELPHA = DELPHI(IDPHM2)                                           VELPOT  00687
      DELPHC = DELPHI(IDPHM1)                                           VELPOT  00688
      SDELPH = (2.0*DELPHC - DELPHA - DELPHB)/XSUBDV                    VELPOT  00689
      GO TO 955                                                         VELPOT  00690
C                                                                       VELPOT  00691
C         MACH RAY UNAVAILABLE.  ARE THERE 2 BOXES ON THE CHORD -       VELPOT  00692
  945 IF (NCDA .NE. 1) GO TO 3020                                       VELPOT  00693
C                                                                       VELPOT  00694
C         CHORDWISE LINEAR EXTRAPOLATION                                VELPOT  00695
C                                                                       VELPOT  00696
  950 CONTINUE                                                          VELPOT  00697
      IDPHM1 = LOCSDW(IUCENT-1+IOVLP, JUCENT, IPNTRM,LMODES, 1,LMODES)  VELPOT  00698
      SDELPH = (DELPHB - DELPHI(IDPHM1))/XSUBDV                         VELPOT  00699
C                                                                       VELPOT  00700
C         LOOP TO COMPUTE AND STORE TRAILING EDGE VELOCITY POTENTIALS   VELPOT  00701
  955 CONTINUE                                                          VELPOT  00702
      JA = JEXLOC - NSUBD2                                              VELPOT  00703
      JB = JEXLOC + NSUBD2                                              VELPOT  00704
      DO 960 JJ = JA,JB                                                 VELPOT  00705
      XINCR = TEXLOC(JJ) - IROW                                         VELPOT  00706
      IF (XINCR .LT. -XSUBDV/2.0) GO TO 960                             VELPOT  00707
      TVP(JJ) = DELPHB + XINCR*SDELPH                                   VELPOT  00708
  960 CONTINUE                                                          VELPOT  00709
C         ALL TRAILING EDGE VALUES HAVE BEEN COMPUTED FOR THIS          VELPOT  00710
C         UNSUBDIVIDED BOX.                                             VELPOT  00711
      GO TO 1030                                                        VELPOT  00712
C                                                                       VELPOT  00713
C     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -   VELPOT  00714
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C                                                                       VELPOT  00715
C         BOX IS IN THE TRAILING EDGE DIAPHRAGM AREA.  COMPUTE THE WAKE VELPOT  00716
C         VELOCITY POTENTIAL CONTRIBUTION                               VELPOT  00717
  980 CONTINUE                                                          VELPOT  00718
      IF (COPLAN) GO TO 985                                             VELPOT  00719
      JJ = JEXLOC                                                       VELPOT  00720
      GO TO 990                                                         VELPOT  00721
  985 JJ = JCOL                                                         VELPOT  00722
      IF (JJ .GT. MYBST) GO TO 990                                      VELPOT  00723
      JJT = JJ + MYBSW                                                  VELPOT  00724
      IF (FLOAT(IROW) .GT. TEXLOC(JJT) ) JJ = JJT                       VELPOT  00725
  990 CONTINUE                                                          VELPOT  00726
C         COMPUTE (X-DISTANCE/B1) * KI                                  VELPOT  00727
      XDKVL = (FLOAT(IROW)-TEXLOC(JJ) ) * XKVL/XSUBDV                   VELPOT  00728
      AZERO =  TVP(JJ) * CMPLX( COS(XDKVL), -SIN(XDKVL) )               VELPOT  00729
      IF (.NOT. CBOX) GO TO 1010                                        VELPOT  00730
      IF (IUCENT+IOVLP .GT. NPNTRS) GO TO 1010                          VELPOT  00731
C         SET DELPHI VALUE TO ZERO, TO CLEAN UP LEFT OVER MODE SHAPES   VELPOT  00732
      I = LOCSDW(IUCENT+IOVLP,JUCENT, IPNTRM, LMODES,1,LMODES)          VELPOT  00733
      IF (I .NE. 0) DELPHI(I) = (0.,0.)                                 VELPOT  00734
      GO TO 1010                                                        VELPOT  00735
C                                                                       VELPOT  00736
C         BOX IS IN A LEADING EDGE OR TIP DIAPHRAGM AREA                VELPOT  00737
 1000 CONTINUE                                                          VELPOT  00738
      AZERO = (0.,0.)                                                   VELPOT  00739
C                                                                       VELPOT  00740
C         COMPUTE NORMAL-WASH VALUES FOR A (SUBDIVIDED) DIAPHRAGM BOX   VELPOT  00741
C                                                                       VELPOT  00742
 1010 CONTINUE                                                          VELPOT  00743
      IF (SUBOFF) GO TO 1015                                            VELPOT  00744
      ENDIF = (AZERO - DELPH)/ SKERNL(1)                                VELPOT  00745
      ENSUM = -(ENRULU(JUCENT) + ENRLLL(JUCENT) )                       VELPOT  00746
      ENSUM =  CMPLX(REAL(ENSUM), AIMAG(ENSUM) + XKVL*XSUBDV*(IROW -    VELPOT  00747
     1              ICENT)*REAL(ENSUM) ) / XSUBDV                       VELPOT  00748
      GO TO 1020                                                        VELPOT  00749
 1015 CONTINUE                                                          VELPOT  00750
      ENDIF = (AZERO - DELPH)/ PKERNL(1)                                VELPOT  00751
      ENSUM = -(ENRULU(JUCENT) + ENRLLL(JUCENT) )                       VELPOT  00752
C                                                                       VELPOT  00753
 1020 CONTINUE                                                          VELPOT  00754
      ENSRUS =  0.5*(ENSUM + ENDIF)                                     VELPOT  00755
      ENSRLS =  0.5*(ENSUM - ENDIF)                                     VELPOT  00756
      IF (SUBOFF) GO TO 1030                                            VELPOT  00757
      GO TO 1035                                                        VELPOT  00758
C                                                                       VELPOT  00759
C     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -   VELPOT  00760
C                                                                       VELPOT  00761
C         STORE THE NORMAL WASH VALUES                                  VELPOT  00762
C                                                                       VELPOT  00763
 1030 CONTINUE                                                          VELPOT  00764
      IF (SUBOFF) GO TO 1100                                            VELPOT  00765
C                                                                       VELPOT  00766
C         STORE THE COMPUTED SUBDIVIDED NORMAL WASHES                   VELPOT  00767
 1035 CONTINUE                                                          VELPOT  00768
      CALL STOSDW (IROW,JCOL, ENSBD, IBOX,LBXCD, IXBS,MXBS,MYBBS,IRR)   VELPOT  00769
      IF (IRR .NE. 0) GO TO 3030                                        VELPOT  00770
      IF (.NOT. LBOX) GO TO 1100                                        VELPOT  00771
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C                                                                       VELPOT  00772
C         DETERMINE THE UNSUBDIVIDED NORMAL WASH VALUES                 VELPOT  00773
 1040 IF (NCDCEN - 1) 1100,1050,1060                                    VELPOT  00774
C         IF THE BOX IS COMPLETE, THE VALUE IS ALREADY STORED -         VELPOT  00775
 1050 IF (FULLBX(JUCENT)) GO TO 1100                                    VELPOT  00776
C         THE UNSUBDIVIDED VALUE EQUALS THE AVERAGE OF ALL ITS          VELPOT  00777
C         SUBDIVIDED BOXES                                              VELPOT  00778
 1060 CONTINUE                                                          VELPOT  00779
      II = ICENT - NSUBD2                                               VELPOT  00780
      JJJ = JCENT + NSUBD2                                              VELPOT  00781
      ENSRUS = (0.,0.)                                                  VELPOT  00782
      ENSRLS = (0.,0.)                                                  VELPOT  00783
      DO 1080 I = 1,NSUBDV                                              VELPOT  00784
      JJ  = JCENT - NSUBD2                                              VELPOT  00785
      CALL DCODER(IBOX,LBXCD, II,JJ, II,JJJ, .T., ICODE )              VELPOT  00786
      DO 1075 J = 1,NSUBDV                                              VELPOT  00787
      IF (ICODE(J) .EQ. 0) GO TO 1070                                   VELPOT  00788
      LOCDW = LOCSDW( II,JJ, IPNTSD,IPNTIN,IPNTOT,IPNTLS)              VELPOT  00789
      ENSRUS = ENSUBD(1,LOCDW) + ENSRUS                                 VELPOT  00790
      ENSRLS = ENSUBD(2,LOCDW) + ENSRLS                                 VELPOT  00791
 1070 CONTINUE                                                          VELPOT  00792
      JJ = JJ + 1                                                       VELPOT  00793
 1075 CONTINUE                                                          VELPOT  00794
      II = II + 1                                                       VELPOT  00795
 1080 CONTINUE                                                          VELPOT  00796
      ENSRUS = ENSRUS/XSUBDV                                            VELPOT  00797
      ENSRLS = ENSRLS/XSUBDV                                            VELPOT  00798
C                                                                       VELPOT  00799
C         RESTORE THE PARTIAL BOX FLAG FOR THE NEXT ROW                 VELPOT  00800
      FULLBX(JUCENT) = .T.                                              VELPOT  00801
C                                                                       VELPOT  00802
C         STORE THE UNSUBDIVIDED NORMAL WASHES                          VELPOT  00803
 1090 CONTINUE                                                          VELPOT  00804
      LOCNW = LOCSDW( IUCENT+IOVLPN, JUCENT, IPNTDW, LPNTDW,1,LPNTDW ) VELPOT  00805
      IF (LOCNW .EQ. 0 ) GO TO 3040                                     VELPOT  00806
      ENRUS(LOCNW) = ENSRUS                                             VELPOT  00807
      IF (WING) GO TO 1095                                              VELPOT  00808
      ENRLS(LOCNW       ) = ENSRLS                                      VELPOT  00809
      GO TO 1100                                                        VELPOT  00810
 1095 ENRLS(LOCNW) = ENSRLS                                             VELPOT  00811
 1100 CONTINUE                                                          VELPOT  00812
      JEXLOC = JEXLOC + 1                                               VELPOT  00813
C                                                                       VELPOT  00814
C                                                                       VELPOT  00815
 1200 CONTINUE                                                          VELPOT  00816
C         END OF LOOP ON (SUBDIVIDED) CHORDS,  STARTING AT 355*         VELPOT  00817
C                                                                       VELPOT  00818
C                                                                       VELPOT  00819
 1300 CONTINUE                                                          VELPOT  00820
C         END OF LOOP ON (SUBDIVIDED) ROWS,   STARTING AT  120         VELPOT  00821
C                                                                       VELPOT  00822
C                                                                       VELPOT  00823
      RETURN                                                            VELPOT  00824
C                                                                       VELPOT  00825
C     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -     VELPOT  00826
C                                                                       VELPOT  00827
C         DIAGNOSTICS - ALL CALL FLOW                                   VELPOT  00828
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C                                                                       VELPOT  00829
 3010 WRITE (NT6,9010)                                                  VELPOT  00830
      WRITE (NT6,9999) IROW,JCOL, IUCENT,JUCENT                         VELPOT  00831
      GO TO 420                                                         VELPOT  00832
 3020 WRITE (NT6,9020)                                                  VELPOT  00833
      GO TO 3999                                                        VELPOT  00834
 3030 WRITE (NT6,9030)                                                  VELPOT  00835
      GO TO 3999                                                        VELPOT  00836
 3040 WRITE (NT6,9040)                                                  VELPOT  00837
      GO TO 3999                                                        VELPOT  00838
C                                                                       VELPOT  00839
 3999 WRITE (NT6,9999)  IROW,JCOL, IUCENT,JUCENT                        VELPOT  00840
      CALL FLUSH(1)                                                     VELPOT  00841
C                                                                       VELPOT  00842
C                                                                       VELPOT  00843
 9010 FORMAT(56HO*** WARNING - NO PLANFORM CONTROL POINT FOUND FOR SUBDI VELPOT  00844
     1  52HVIDED BOX DURING VELOCITY POTENTIAL CALCULATIONS *** )        VELPOT  00845
 9020 FORMAT(56HO*** ERROR - THE TIP BOX PATTERN DOES NOT ALLOW TRAILING VELPOT  00846
     1 44H EDGE VELOCITY POTENTIALS TO BE COMPUTED *** )                VELPOT  00847
 9030 FORMAT(56HO*** ERROR - FAILURE IN STORING SUBDIVIDED NORMAL-WASHES VELPOT  00848
     1  4H *** )                                                        VELPOT  00849
 9040 FORMAT(53HO*** ERROR - FAILURE IN STORING CONTROL POINT NORMAL-    VELPOT  00850
     1   10HWASHES *** )                                               VELPOT  00851
 9999 FORMAT(14X,16HSUBDIVIDED BOX (,I3,1H,I3,19H),  CONTROL POINT (,   VELPOT  00852
     1    I2,1H,I2,1H)  )                                              VELPOT  00853
C                                                                       VELPOT  00854
      END                                                               VELPOT  00855
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      COMPLEX FUNCTION B (IROW,JCOL, PKERNL,SKERNL, IBOX,LBXCD,          B       00002
     1                    WING, DIH)                                    B       00003
C                                                                       B       00004
C       COMPUTES B =  SUM OVER NU(SUM OVER MU((DOWNWASH)*(KERNEL)) )    B       00005
C                     (NU,MU .NE. 0)                                    B       00006
C               B IS USED TO COMPUTE VELOCITY POTENTIALS OF ON-         B       00007
C               PLANFORM BOXES, OR DOWNWASHES OF DIAPHRAGM BOXES        B       00008
C                                                                       B       00009
C       PARAMETERS -                                                    B       00010
C            IROW   = ROW LOCATION OF BOX FOR WHICH B IS TO BE          B       00011
C                     COMPUTED                                          B       00012
C            JCOL   = COLUMN LOCATION OF BOX                            B       00013
C            PKERNL = PRIMARY KERNEL ARRAY                              B       00014
C            SKERNL = SUBDIVIDED KERNEL ARRAY                           B       00015
C            IBOX   = ARRAY OF BOX CODES                                B       00016
C            LBXCD  = LENGTH OF BOX CODE ARRAY                          B       00017
C            WING   = .T., WING.   .F., TAIL                            B       00018
C            DIH    = .T., LEFT SIDE TO BE IGNORED (SURFACE HAS DIHDRL  B       00019
C                   = .F., LEFT SIDE TO BE INCLUDED                     B       00020
C                                                                       B       00021
C       VALUES FROM COMMON -                                            B       00022
C            NSUBDV = NUMBER OF SUBDIVISIONS                            B       00023
C            IXB    = CENTER OF FIRST UNSUBDIVIDED BOX RELATIVE TO THE  B       00024
C                     SUBDIVIDED PATTERN                                B       00025
C            MXB    = NUMBER OF UNSUBDIVIDED ROWS                       B       00026
C            MYBB   = NUMBER OF UNSUBDIVIDED CHORDS, INCLUDING DIAPH.   B       00027
C            MYBBS  = NUMBER OF SUBDIVIDED CHORDS, INCLUDING  DIAPH.    B       00028
C            MXSKRN = SIZE OF SUBDIVIDED KERNEL                         B       00029
C            SYM    = SYMMETRY INDICATOR                                B       00030
C                                                                       B       00031
C            LROT   = NSUBDV + NSUBDV/2 + 1                             B       00032
C            ENSUBD =         SUBDIVIDED NORMAL-WASHES                  B       00033
C            ENRUS, ENRLS  = UNSUBDIVIDED NORMAL-WASHES                 B       00034
C            IPNTDW = POINTER ARRAY FOR UNSUBDIVIDED NORMAL WASHES      B       00035
C            IPWTSD = POINTER ARRAY FOR SUBDIVIDED NORMAL WASHES (END-  B       00036
C                     AROUND                                            B       00037
C             IPNTIN = NEXT AVAILABLE POINTER                           B       00038
C             IPNTOT = FIRST POINTER IN USE                             B       00039
C             IPNTLS = DIMENSION OF ARRAY IPWTSD                        B       00040
C             LIMDW3 = DIMENSION OF SUBDIVIDED NORMAL-WASH ARRAYS       B       00041
C                                                                       B       00042
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBDC,NSUBCN,NSURF,         GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,             GEOMTY  00003
     2                MXBW,MXBDW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,        GEOMTY  00004
     3                IXBW,XCENTR                                      GEOMTY  00005
      LOGICAL COPLAN                                                    GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,IXBT,MYBT,MYBBT,MYSSY,MYBST,      GEOM2   00002
     1                MYBBSY,IXBT,IXBST,CAPL                           GEOM2   00003
      COMMON / MODES/ SYM,SYMT,MTYPEW,MTYPET                            MODCOM  00002
      COMMON /SWASH/ IPNTSD(2,50), ENSUBD(2,600),  IPNTIN,IPNTOT,IPNTLS SWASH   00002
C                    IPNTSD(LPNTSD), ENSUBD(2*LSDW                      SWASH   00003
      COMPLEX ENSUBD                                                    SWASH   00004
      COMMON /WASHES/ IPNTDW(2,100),ENRUS(1275), ENRLS(1275),IOMEGAPN   WASHES  00002
      COMPLEX                        ENRUS,      ENRLS                  WASHES  00003
      COMMON / KERN / ERR,MXSKRN,IPKERN,NPLKRN,NSPATK,NROWEA            KERN    00002
C                   DELPHI(LMODES),TVP(LTVP),TEXLOC(LTVP)               DELTAP  00002
      COMMON /DELTAP/ DELPHI(1080), TVP(250), TEXLOC(250), FEXLOC(250), DELTAP  00003
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     1                IPNTRM(2,100),NPNTRS, IOVLAP                    DELTAP  00004
      COMPLEX          DELPHI,       TVP                              DELTAP  00005
C                    DEFSL(2,LMODES)                                  DELTAP  00006
      DIMENSION      DEFSL(2,1000)                                    DELTAP  00007
      EQUIVALENCE     (DELPHI(61), DEFSL)                             DELTAP  00008
C               ARRAYS DELPHI AND DEFSL ARE                           DELTAP  00009
C               EQUIVALENCED TO GIVE A 2 ROW UN-OVERLAPPED SECTION    DELTAP  00010
      COMMON /LROT  / LROT                                            B       00050
C                                                                     B       00051
C                                                                     B       00052
      COMPLEX PKERNL(1),SKERNL(1)                                     B       00053
      LOGICAL WING,DIH                                                B       00054
C                                                                     B       00055
      DIMENSION IBXCD(150)                                            B       00056
      LOGICAL LEFT, LSIDE                                             B       00057
C                                                                     B       00058
      IA = IROW                                                       B       00059
      B = (0.,0.)                                                     B       00060
C                                                                     B       00061
      IF (WING) GO TO 20                                              B       00062
C                                                                     B       00063
      IXB   = IXBT                                                    B       00064
      IXBS  = IXBST                                                   B       00065
      MXB = MXBT - (IXBT-IXBW)/NSUBDV                                 B       00066
      MYBBS = MYBBST                                                  B       00067
      IOVLPN = IOVLAPN                                                B       00068
      SYMTY = SYMT                                                    B       00069
      GO TO 25                                                        B       00070
   20 CONTINUE                                                        B       00071
      IXB   = IXBW                                                    B       00072
      IXBS  = 1                                                       B       00073
      MXB   = MXWBW                                                   B       00074
      IF (COPLAN) MXB = MXBT                                          B       00075
      MYBBS = MYBBSW                                                  B       00076
      IOVLPN = 0                                                      B       00077
      SYMTY = SYM                                                     B       00078
   25 CONTINUE                                                        B       00079
      LSIDE = SYMTY .NE. 0 .AND  .NOT. DIH                            B       00080
C                                                                     B       00081
C        IS SUBDIVISION REQUESTED -                                   B       00082
      IF (NSUBDV .EQ. 1) GO TO 410                                    B       00083
C                                                                     B       00084
C        YES.  DETERMINE THE NUMBER OF ROWS WHICH CAN BE HANDLED (MXB1) B      00085
      NSRWM1 = IPNTIN - IPNTOT - 1                                    B       00086
      IF (NSRWM1 .LT. 0) NSRWM1 = NSRWM1 + IPNTLS                     B       00087
      NSRWM1 = MIN0(NSRWM1,MXSKRN-1)                                  B       00088
      IF (IA - IXBS .GT. NSRWM1) GO TO 120                            B       00089
C        ALL SUBDIVIDED.  ALLOW TO GO ONE BEYOND TO TRIGGER RETURN.   B       00090
      MXB1 = IA - IXBS + 1                                            B       00091
      GO TO 200                                                       B       00092
C        PARTIAL SUBDIVIDED                                           B       00093
  120 CONTINUE                                                        B       00094
      I = IA - NSRWM1 - IXB                                           B       00095
      I = MOD(I,NSUBDV)                                               B       00096
      I = LROT -I                                                     B       00097
      MXB1 = NSRWM1 - MOD(I,NSUBDV)                                   B       00098
C                                                                     B       00099
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C         DETERMINE THE CONTRIBUTION TO B FROM A FORWARD CONE OF SUB-    B      00100
C         DIVIDED BOXES                                                  B      00101
C              NU = ROW NUMBER OF CONTRIBUTING BOX RELATIVE TO RECEIVING B      00102
C                   BOX.  NU OF RECEIVING BOX = 0.                       B      00103
C              IA = ACTUAL ROW LOCATION OF CONTRIBUTING BOX, RELATIVE TO B      00104
C                   SUBDIVIDED GRID.                                     B      00105
C                                                                        B      00106
  200 CONTINUE                                                           B      00107
      IF (MXB1 .EQ. 0) GO TO 310                                         B      00108
      DO 300 NU = 1,MXB1                                                 B      00109
      IA = IA - 1                                                        B      00110
C         HAS THE FORWARD EDGE OF THE PATTERN BEEN REACHED -             B      00111
      IF (IA .LT. IXBS) GO TO 600                                        B      00112
C         NO. GET BOX TYPE CODES FOR CURRENT ROW.                        B      00113
      LEFT = .T.                                                         B      00114
      IIA = MOD(IA-1,IPNTLS) + 1                                         B      00115
      IIAP1 = MOD(IA,IPNTLS) + 1                                         B      00116
      IPNTP1 = IPNTSD(1,IIAP1)                                           B      00117
      IF (IPNTP1 .LE. 1) GO TO 208                                       B      00118
      NYB = IPNTP1          - IPNTSD(1,IIA) + IPNTSD(2,IIA) - 1          B      00119
      GO TO 210                                                          B      00120
  208 NYB = MYBBS                                                        B      00121
  210 CONTINUE                                                           B      00122
      CALL DCODER (IBOX,LBXCD, IA,1, IA,NYB, .T., IBXCD )                B      00123
      IF (NYB .    MYBBS) GO TO 215                                      B      00124
      DO 212 I = 1,MYBBS                                                 B      00125
      IF (IBXCD(NYB) .NE. 0) GO TO 215                                   B      00126
      NYB = NYB - 1                                                      B      00127
  212 CONTINUE                                                           B      00128
  215 CONTINUE                                                           B      00129
C              IBXCD  = ROW OF BOX CODES                                 B      00130
C              NYB    = NUMBER FOUND                                     B      00131
C                                                                        B      00132
C         GET LOCATION IN THE SUBDIVIDED DOWNWASH ARRAY FOR BOX(IA,JCOL) B      00133
      IDW = LOCSDW(IA,JCOL, IPNTSD,IPNTIN,IPNTOT,IPNTLS)                 B      00134
      N = (NU*(NU+1))/2 + 1                                              B      00135
C         KERNEL(NU,MU) = SKERNL((NU*(NU+1))/2 + ABS(MU) + 1) , SO       B      00136
C              N        = SUBSCRIPT FOR KERNEL (STARTING WITH NU,0 )     B      00137
C                                                                        B      00138
C         CENTER BOX OF ROW IN CONE                                      B      00139
      IF (JCOL .GT. NYB) GO TO 220                                       B      00140
      IF (IBXCD(JCOL) .EQ. 0) GO TO 220                                  B      00141
      B = B + SKERNL(N) * (ENSUBD(1,IDW) - ENSUBD(2,IDW) )               B      00142
  220 CONTINUE                                                           B      00143
C                                                                        B      00144
C                                                                        B      00145
C         GOING OUT FROM CENTER CHORD OF CONE IN BOTH DIRECTIONS          B      00146
C           IDWR,IDWL = POINTERS IN DOWNWASH ARRAY FOR RIGHT,LEFT SIDES  B      00147
C           IBXR,IBXL = POINTERS IN BOX CODES ARRAY, AS ABOVE            B      00148
C              L      = LEFT SIDE POINTER INCREMENTER (CHANGES SIGN WHEN B      00149
C                       THE PLANFORM CENTER-LINE IS ENCOUNTERED)         B      00150
C              E      = LEFT SIDE MULTIPLIER, USED TO DETERMINE SYM/ANTI B      00151
C                       SYM. AFTER PLANFORM CENTER-LINE ENCOUNTERED.     B      00152
      IDWR = IDW+1                                                       B      00153
      IDWL = IDW-1                                                       B      00154
      IBXR = JCOL+1                                                      B      00155
      IBXL = IBXR-2                                                      B      00156
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      N = N + 1                                                          B      00157
      L = -1                                                             B      00158
      E = 1.0                                                            B      00159
C                                                                        B      00160
      DO 280 MU = 1,NU                                                   B      00161
C                                                                        B      00162
C         RIGHT SIDE                                                     B      00163
      IF (IBXR .GT. NYB) GO TO 230                                       B      00164
      IF (IBXCD(IBXR) .EQ. 0) GO TO 230                                  B      00165
      B = B + SKERNL(N) * (ENSUBD(1,IDWR) - ENSUBD(2,IDWR) )             B      00166
  230 CONTINUE                                                           B      00167
C                                                                        B      00168
C         LEFT SIDE                                                      B      00169
C                                                                        B      00170
      IF (.NOT. LEFT) GO TO 270                                          B      00171
C         HAS PLANFORM CENTER LINE BEEN ENCOUNTERED -                    B      00172
      IF (IBXL .GT. 0) GO TO 250                                         B      00173
C         YES.  SET PARAMETERS TO SWEEP BACK ACROSS RIGHT HALF AS A      B      00174
C         SYMMETRIC/ANTISYMMETRIC IMAGE OF THE LEFT SIDE.                B      00175
      LEFT = LSIDE                                                       B      00176
      IF (.NOT. LEFT) GO TO 270                                          B      00177
      E = SYMTY                                                          B      00178
      L = 1                                                              B      00179
      IBXL = 1                                                           B      00180
      IDWL = IDWL + 1                                                    B      00181
      GO TO 260                                                          B      00182
C         IF THE CENTER LINE HAS PREVIOUSLY BEEN ENCOUNTERED, IBXL WILL  B      00183
C         BE INCREASING. IF IBXL HAS EXCEEDED THE NUMBER OF BOXES ON     B      00184
C         THIS ROW, THIS ROW IS COMPLETE, TRANSFER TO LOOP ON NU.        B      00185
  250 IF (IBXL .GT. NYB) GO TO 270                                       B      00186
  260 IF (IBXCD(IBXL) .EQ. 0) GO TO 270                                  B      00187
      B = B + SKERNL(N) * (ENSUBD(1,IDWL) - ENSUBD(2,IDWL) ) * E         B      00188
  270 CONTINUE                                                           B      00189
C                                                                        B      00190
C         SET COUNTERS FOR NEXT STEP OUTWARD                             B      00191
      IDWR = IDWR+1                                                      B      00192
      IDWL = IDWL+L                                                      B      00193
      IBXR = IBXR+1                                                      B      00194
      IBXL = IBXL+L                                                      B      00195
      N = N+1                                                            B      00196
  280 CONTINUE                                                           B      00197
C         END OF LOOP ON MU (SUBDIVIDED COLUMNS OUTBOARD)                B      00198
C                                                                        B      00199
  300 CONTINUE                                                           B      00200
C         END OF LOOP ON NU (SUBDIVIDED ROWS FORWARD)  FROM 200          B      00201
C                                                                        B      00202
C         IS THERE AT LEAST ONE FULL UNSUBDIVIDED ROW LEFT AHEAD OF      B      00203
C         CURRENT POSITION -                                             B      00204
  310 CONTINUE                                                           B      00205
      IF (IA .LT. IX8   ) GO TO 800                                      B      00206
C                                                                        B      00207
C                                                                        B      00208
C         UNSUBDIVIDED BOXES                                             B      00209
C                                                                        B      00210
C         DETERMINE ROW AND COLUMN NUMBERS IN SUBDIVIDED ARRAYS CORRES-  B      00211
C         PONDING TO UNSUBDIVIDED BOX CENTERS.                           B      00212
C              IA     = ROW LOCATION OF CONTRIBUTING SUBDIVIDED BOX      B      00213
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C             IIA    = ROW LOCATION OF UNSUBDIVIDED BOX                    B      00214
C             INU    = FIRST ROW OF UNSUBDIVIDED BOXES TO USE, COUNTING    B      00215
C                      OUTWARD.                                            B      00216
C             JJJ    = UNSUBDIVIDED CHORD NUMBER OF RECEIVING BOX          B      00217
C                                                                          B      00218
      IA = IA + NSUBD2                                                     B      00219
      IIA = (IA - IXBW)/NSUBDV + 1                                         B      00220
      INU = MXB1  /NSUBDV + 1                                              B      00221
      JJJ = (JCOL-1)/NSUBDV + 1                                            B      00222
      GO TO 420                                                            B      00223
C                                                                          B      00224
C        SET UP POINTERS IF NO SUBDIVISION WAS REQUESTED                   B      00225
C                                                                          B      00226
  410 CONTINUE                                                             B      00227
C     IA WAS SET TO IROW UPON ENTRY                                        B      00228
      IIA = IA                                                             B      00229
      INU = 1                                                              B      00230
      JJJ=JCOL                                                             B      00231
C                                                                          B      00232
C        DETERMINE THE CONTRIBUTION TO B FROM A FORWARD CONE OF UNSUB-     B      00233
C        DIVIDED BOXES, STARTING WHERE SUBDIVISION LEFT OFF.               B      00234
C             NU = ROW NUMBER OF CONTRIBUTING BOX RELATIVE TO RECEIVING    B      00235
C                  BOX.                                                    B      00236
C                                                                          B      00237
  420 DO 500 NU = INU,MXB                                                  B      00238
      IA = IA - NSUBDV                                                     B      00239
      IIA = IIA -1                                                         B      00240
C        HAS THE FORWARD EDGE OF THE PATTERN BEEN REACHED -                B      00241
      IF (IA .LT. IXB) GO TO 600                                           B      00242
C        NO.  GET BOX TYPE CODES FOR CURRENT ROW, UNSUBDIVIDED BOX         B      00243
C        CENTERS ONLY                                                      B      00244
      LEFT = .T.                                                           B      00245
      IIAVLPN = IIA + IOVLPN                                               B      00246
      NYB = IPNTDW(1,IIAVLPN+1) - IPNTDW(1,IIAVLPN) + IPNTDW(2,IIAVLPN)    B      00247
     1         - 1                                                         B      00248
      CALL DCODER(IBOX,LBXCD, IIA,1, IIA,NYB, .F., IBXCD)                  B      00249
C             IBXCD = ROW OF BOX CODES                                     B      00250
C             NYB   = NUMBER FOUND                                         B      00251
C                                                                          B      00252
C        GET LOCATION IN UNSUBDIVIDED DOWNWASH ARRAY FOR BOX(IIA,JJJ)      B      00253
      IDW  = LOCSDW(IIAVLPN,JJJ, IPNTDW, IIAVLPN+1,1,IIAVLPN+2)            B      00254
C                                                                          B      00255
      N = (NU*(NU+1))/2 + 1                                                B      00256
C             N      = UNSUBDIVIDED KERNEL SUBSCRIPT FOR NU = 0.           B      00257
C                                                                          B      00258
C        CENTER BOX                                                        B      00259
      IF (JJJ .GT. NYB) GO TO 425                                          B      00260
      IF (IBXCD(JJJ) .NE. 0) B = B + PKERNL(N)*(ENRUS(IDW)-ENRLS(IDW) )    B      00261
  425 CONTINUE                                                             B      00262
C                                                                          B      00263
C        GOING OUT FROM CENTER CHORD IN BOTH DIRECTIONS                    B      00264
      IDWR = IDW+1                                                         B      00265
      IDWL = IDW-1                                                         B      00266
      IBXR = JJJ+1                                                         B      00267
      IBXL = IBXR-2                                                        B      00268
      L = -1                                                               B      00269
      E =  1.0                                                             B      00270
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      N =  N + 1                                                        B      00271
C                                                                       B      00272
      DO 480 MU = 1,NU                                                  B      00273
C                                                                       B      00274
C         RIGHT SIDE                                                    B      00275
      IF (IBXR .GT. NYB) GO TO 430                                      B      00276
      IF (IBXCD(IBXR) .EQ. 0) GO TO 430                                 B      00277
      B = B + PKERNL(N) * (ENRUS(IDWR) - ENRLS(IDWR) )                  B      00278
  430 CONTINUE                                                          B      00279
C                                                                       B      00280
C         LEFT SIDE                                                     B      00281
C                                                                       B      00282
      IF (.NOT. LEFT) GO TO 470                                         B      00283
C         HAS PLANFORM CENTER LINE BEEN ENCOUNTERED -                   B      00284
      IF (IBXL .GT. 0) GO TO 450                                        B      00285
C         YES.  SET PARAMETERS TO SWEEP BACK ACROSS RIGHT SIDE          B      00286
      LEFT = LSIDE                                                      B      00287
      IF (.NOT. LEFT) GO TO 470                                         B      00288
      E  = SYMTY                                                        B      00289
      L = 1                                                             B      00290
      IBXL = 1                                                          B      00291
      IDWL = IDWL + 1                                                   B      00292
C         TEST FOR ROW COMPLETE, AS IN SUBDIVIDED LOGIC                 B      00293
  450 IF (IBXL .GT. NYB) GO TO 470                                      B      00294
  460 IF (IBXCD(IBXL) .EQ. 0) GO TO 470                                 B      00295
      B = B + PKERNL(N) * (ENRUS(IDWL) - ENRLS(IDWL) )  * E             B      00296
  470 CONTINUE                                                          B      00297
C         SET COUNTERS FOR NEXT STEP OUTWARD                            B      00298
      IDWR = IDWR+1                                                     B      00299
      IDWL = IDWL+L                                                     B      00300
      IBXR = IBXR+1                                                     B      00301
      IBXL = IBXL+1.                                                    B      00302
      N = N + 1                                                         B      00303
  480 CONTINUE                                                          B      00304
C         END OF LOOP ON MU (CHORDS OUTWARD)                            B      00305
C                                                                       B      00306
  500 CONTINUE                                                          B      00307
C         END OF LOOP ON NU (ROWS FORWARD) FROM  420                    B      00308
C                                                                       B      00309
C                                                                       B      00310
  600 RETURN                                                            B      00311
C                                                                       B      00312
      END                                                               B      00313
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      SUBROUTINE GETAIC(JUCENT, ITPE, ICODE, IR)                        GETAIC  00002
C                                                                       GETAIC  00003
C         GETS DESIRED AIC ARRAYS FROM DISK                             GETAIC  00004
C                                                                       GETAIC  00005
C         JUCENT = CHORD NUMBER                                         GETAIC  00006
C         ITPE  = 1, WING/WING       3, RIGHT WING/TAIL                 GETAIC  00007
C                 2, TAIL/TAIL       4, LEFT WING/TAIL                  GETAIC  00008
C         ICODE  = 0, C,V,W DESIRED                                     GETAIC  00009
C                  1,   V,W DESIRED                                     GETAIC  00010
C                 2,    W   DESIRED                                     GETAIC  00011
C         IR     = ERROR RETURN   0, SUCCESS          2, C,W NOT FOUND  GETAIC  00012
C                                 1, C NOT FOUND      3, NOTHING FOUND  GETAIC  00013
C                                                                       GETAIC  00014
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,         FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC         FILES   00003
      COMMON /TAPEIO/ NFS,NMS,LS,NMR,ID(20),NID,ITYPE,LRS,LWS,M,N,      TAPEIO  00002
     1                PARM(10),IRR                                     TAPEIO  00003
      DIMENSION IPARM(10)                                               TAPEIO  00004
      EQUIVALENCE (PARM,IPARM)                                          TAPEIO  00005
      COMMON /MUAICS/ YBAR,EL,MUAIC(2,50),NROWS,SURF,                   MUAICS  00002
     1                YBARL,ELL, MUAICL(2,50),NROWSL,SURFL,PSIDIF      MUAICS  00003
      LOGICAL SURF,SURFL                                                MUAICS  00004
      COMMON /PAICS / NWK,  NTTK,  NRWTK,  NLWTK,   PAIC(4,50)          PAICS   00002
      INTEGER PAIC                                                      PAICS   00003
      DIMENSION NK(4)                                                   PAICS   00004
      EQUIVALENCE (NWK,NK(1))                                           PAICS   00005
      COMMON /AICS  / XKVL,   C(1640),W(1640),V(1640)                   AICS    00002
      COMPLEX               C,      W,      V                           AICS    00003
      COMMON /ARRAYS/ KBXCDW,LBXCDW,LBCXC,KBXCDT,LBXCDT,KJALPH,LJALPH,  ARRAYS  00002
     1                KALPHA,KKERNL,LKERNL,KPNTRM,LPNTRM,KDEFSL,KELPHI, ARRAYS  00003
     2                LMODES,KPNTSD,LPNTSD,KSDW,LSDW,KPNTDW,LPNTDW,     ARRAYS  00004
     3                KDW,LDW,KTVP,LTVP                                 ARRAYS  00005
      LOGICAL MXWRIT,RANDOU                                             GETAIC  00022
      DATA  MXWRIT,RANDOU / .F.,.F. /                                   GETAIC  00023
      DATA IPAIC,IPAICL,IPNT,   IFLAG,IFLAGL, ICODEP / 640 /            FTNX1   00061
C                                                                       GETAIC  00024
      IR = 0                                                            GETAIC  00025
      IF (IPNT .NE. 0) GO TO 160                                        GETAIC  00026
C                                                                       GETAIC  00027
C         INITIAL CALL.  SET UP FILES AND POINTERS                      GETAIC  00028
      REWIND IAICSC                                                     GETAIC  00029
      IPNT = 1                                                          GETAIC  00030
C         EXPAND PAIC ARRAY                                             GETAIC  00031
      I = 4                                                             GETAIC  00032
      IF (NRWTK   .EQ. 0) I = 3                                         GETAIC  00033
      IF (NTTK    .EQ. 0) I = I - 1                                     GETAIC  00034
      IF (NWK     .EQ. 0) I = I - 1                                     GETAIC  00035
      IF (NLWTK   .EQ. 0) GO TO 120                                     GETAIC  00036
      IF (I .EQ. 4) GO TO 140                                           GETAIC  00037
      DO 110 J = 1,NLWTK                                                GETAIC  00038
      PAIC(4,J) = PAIC(I,J)                                             GETAIC  00039
      PAIC(I,J) = 0                                                     GETAIC  00040
  110 CONTINUE                                                          GETAIC  00041
      I = I - 1                                                         GETAIC  00042
  120 CONTINUE                                                          GETAIC  00043
      IF (NRWTK .EQ. 0) GO TO 130                                       GETAIC  00044
      IF (I .EQ. 3) GO TO 140                                           GETAIC  00045
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      DO 125 J = 1, NRWTK                                               GETAIC  00046
      PAIC(3,J) = PAIC(1,J)                                             GETAIC  00047
      PAIC(1,J) = 0                                                     GETAIC  00048
  125 CONTINUE                                                          GETAIC  00049
      I = I - 1                                                         GETAIC  00050
  130 CONTINUE                                                          GETAIC  00051
      IF (NTTK .EQ. 0) GO TO 140                                        GETAIC  00052
      IF (I .EQ. 2) GO TO 140                                           GETAIC  00053
      DO 135 J = 1,NTTK                                                 GETAIC  00054
      PAIC(2,J) = PAIC(1,J)                                             GETAIC  00055
      PAIC(1,J) = 0                                                     GETAIC  00056
  135 CONTINUE                                                          GETAIC  00057
  140 CONTINUE                                                          GETAIC  00058
C         ZERO OUT THE AIC ARRAYS                                       GETAIC  00059
      DO 150 I = 1,LKERNL                                               GETAIC  00060
      C(I) = (0.,0.)                                                    GETAIC  00061
      W(I) = (0.,0.)                                                    GETAIC  00062
      V(I) = (0.,0.)                                                    GETAIC  00063
  150 CONTINUE                                                          GETAIC  00064
C                                                                       GETAIC  00065
C         GET THE AIC LOCATION                                          GETAIC  00066
  160 CONTINUE                                                          GETAIC  00067
      IF (NC(ITPE) .LT. JUCENT) GO TO 290                               GETAIC  00068
      ILOC = PAIC(ITPE,JUCENT)                                          GETAIC  00069
C         ARE THE DESIRED ARRAYS ALREADY IN CORE -                      GETAIC  00070
      IF (ILOC .EQ. IPAIC) GO TO 300                                    GETAIC  00071
      IPAIC = ILOC                                                      GETAIC  00072
      ILOC = (ILOC-1)*4 + 1                                             GETAIC  00073
C                                                                       GETAIC  00074
C         GET THE MUAIC ARRAY  FROM THE NON-PLANAR AIC SCRATCH FILE     GETAIC  00075
C                                                                       GETAIC  00076
C         SPACE AND READ MUAICS                                         GETAIC  00077
      CALL RDINIT                                                       GETAIC  00078
      IF (ILOC - IPNT) 200,220,210                                      GETAIC  00079
C         MUAICS ARE BEHIND CURRENT LOCATION                            GETAIC  00080
  200 REWIND IAICSC                                                     GETAIC  00081
      NRQ = ILOC -1                                                     GETAIC  00082
      GO TO 220                                                         GETAIC  00083
C                                                                       GETAIC  00084
C         REQUIRED MUAICS ARE AHEAD OF CURRENT POSITION                 GETAIC  00085
  210 CONTINUE                                                          GETAIC  00086
      NRQ =  ILOC - IPNT                                                GETAIC  00087
C                                                                       GETAIC  00088
C         READ MUAICS FROM IAICSC                                       GETAIC  00089
  220 CONTINUE                                                          GETAIC  00090
      MXARRY = 9H    MUAIC                                              GETAIC  00091
      K = 2                                                             GETAIC  00092
      CALL READMX( IAICSC, MXWRIT,RANDOU, NFS,NRQ, LS,NWR, K, NID, ID,  GETAIC  00093
     1             ITYPE,  LRS,  MUAIC, M,N, PARM, IRR)                 GETAIC  00094
      IF (IRR .NE. 0) GO TO 3000                                        GETAIC  00095
      NRQRQ = N                                                         GETAIC  00096
      IPNT  = ILOC + 1                                                  GETAIC  00097
      EL    = PARM(5)                                                   GETAIC  00098
      YBAR  = PARM(4)                                                   GETAIC  00099
      ICD   = IPARM(6)                                                  GETAIC  00100
C                                                                       GETAIC  00101
      CALL RDINIT                                                       GETAIC  00102
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C         IS THE C ARRAY DESIRED -                                      GETAIC  00103
      IF (ICODE .NE. 0) GO TO 250                                       GETAIC  00104
C         YES.  IS IT AVAILABLE  -                                      GETAIC  00105
      IF (ICD .EQ. 0) GO TO 240                                         GETAIC  00106
C         NO.  SET THE ERROR FLAG AND CONTINUE                          GETAIC  00107
      IR = 1                                                            GETAIC  00108
      GO TO 250                                                         GETAIC  00109
C         READ THE  C  ARRAY FROM IAICSC                                GETAIC  00110
  240 CONTINUE                                                          GETAIC  00111
      MXARRY = 9HSPATIAL C                                              GETAIC  00112
      CALL READMX( IAICSC, MXWRIT,RANDOU, NFS,NMS, LS,NMR, K, NID, ID,  GETAIC  00113
     1             ITYPE,  LRS,  C,  M,N,  PARM, IRR)                   GETAIC  00114
      IF (IRR .NE. 0) GO TO 3000                                        GETAIC  00115
      CALL RDINIT                                                       GETAIC  00116
      GO TO 260                                                         GETAIC  00117
  250 CONTINUE                                                          GETAIC  00118
      NMS = 1                                                           GETAIC  00119
  260 CONTINUE                                                          GETAIC  00120
      IPNT = IPNT + 1                                                   GETAIC  00121
C         READ THE  W  ARRAY FROM IAICSC                                GETAIC  00122
      MXARRY = 9HSPATIAL W                                              GETAIC  00123
      CALL READMX( IAICSC, MXWRIT,RANDOU, NFS,NMS, LS,NMR, K, NID, ID,  GETAIC  00124
     1             ITYPE,  LRS,  W,  M,N,  PARM, IRR)                   GETAIC  00125
      IF (IRR .NE. 0) GO TO 3000                                        GETAIC  00126
      IPNT = IPNT + 1                                                   GETAIC  00127
      CALL RDINIT                                                       GETAIC  00128
C         IS THE V ARRAY DESIRED -                                      GETAIC  00129
      IF (ICODE .EQ. 2) GO TO 300                                       GETAIC  00130
C         YES.  IS IT AVAILABLE -                                       GETAIC  00131
      IF (ICD .NE. 2) GO TO 280                                         GETAIC  00132
C         NO.  SET ERROR FLAG                                           GETAIC  00133
      IR = IR + 1                                                       GETAIC  00134
      GO TO 300                                                         GETAIC  00135
C         READ THE  V  ARRAY FROM IAICSC                                GETAIC  00136
  280 CONTINUE                                                          GETAIC  00137
      MXARRY = 9HSPATIAL V                                              GETAIC  00138
      CALL READMX( IAICSC, MXWRIT,RANDOU, NFS,NMS, LS,NMR, K, NID, ID,  GETAIC  00139
     1             ITYPE,  LRS,  V,  M,N,  PARM, IRR)                   GETAIC  00140
      IF (IRR .NE. 0) GO TO 3000                                        GETAIC  00141
      IPNT = IPNT + 1                                                   GETAIC  00142
      GO TO 300                                                         GETAIC  00143
C                                                                       GETAIC  00144
C         NO AICS CAN BE FOUND OF THE TYPE DESIRED FOR THIS CHORD       GETAIC  00145
  290 IR = 3                                                            GETAIC  00146
C                                                                       GETAIC  00147
  300 CONTINUE                                                          GETAIC  00148
      RETURN                                                            GETAIC  00149
C                                                                       GETAIC  00150
C         DIAGNOSTIC                                                    GETAIC  00151
C                                                                       GETAIC  00152
 3000 CONTINUE                                                          GETAIC  00153
      WRITE (NT6,9000) IAICSC,IRR                                       GETAIC  00154
      WRITE (NT6,9192) MXARRY, M,N                                      GETAIC  00155
      CALL FLUSH(1)                                                     GETAIC  00156
 9000 FORMAT(49H*** ERROR - WHILE READING FROM SPATIAL AIC FILE ,A10,    GETAIC  00157
     1       14H, ERROR CODE = I4, 4H *** )                             GETAIC  00158
 9192 FORMAT(14X,A10,    20HARRAY, DIMENSIONED (I4,1H,I4,11H) WAS BEING GETAIC  00159
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1         5H READ )                                                    GETAIC  00160
 END                                                                   GETAIC  00161
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      SUBROUTINE STOSDW(IROW,JCOL, EN, IBOX,LBXCD, IXB,MXBS,MYB, IRR)    STOSDW 00002
C                                                                        STOSDW 00003
C         STORES A COMPUTED DOWNWASH VALUE IN THE END-AROUND SUBDIVIDED  STOSDW 00004
C         DOWNWASH ARRAY, AND UPDATES POINTERS WHEN NECESSARY            STOSDW 00005
C                                                                        STOSDW 00006
C              IROW   = BOX CHORDWISE LOCATION                           STOSDW 00007
C              JCOL   = BOX SPANWISE LOCATION                            STOSDW 00008
C              EN     = COMPLEX NORMAL-WASHES TO BY STORED               STOSDW 00009
C              IBOX   = ARRAY OF BOX CODES                               STOSDW 00010
C              LBXCD  = LENGTH OF BOX CODE ARRAY                         STOSDW 00011
C              IXB    = FIRST SUBDIVIDED ROW OF THE PLANFORM             STOSDW 00012
C              MXBS   = MAXIMUM CHORD LENGTH OF SUBDIVIDED PATTERN       STOSDW 00013
C              MYB    = MAXIMUM ROW LENGTH                               STOSDW 00014
C         RETURNS -                                                      STOSDW 00015
C              IRR    = ERROR RETURN, 0 = SUCCESSFUL                     STOSDW 00016
C                     = 1, FUNCTION LOCSDW FOUND THE POINTER OUTSIDE     STOSDW 00017
C                          THE DEFINED SET OF DOWNWASHES                 STOSDW 00018
C              ENSUBD = SUBDIVIDED NORMAL-WASH ARRAY WITH ADDED VALUE    STOSDW 00019
C                                                                        STOSDW 00020
C         COMMON PARAMETERS USED                                         STOSDW 00021
C              MXSKRN = MAXIMUM SIZE OF THE SUBDIVIDED KERNEL            STOSDW 00022
C              LSDW   = DIMENSION OF SUBDIVIDED NORMAL WASH ARRAY        STOSDW 00023
C              IPNTSD = POINTER ARRAY FOR SUBDIVIDED NORMAL WASH ARRAY   STOSDW 00024
C              IPNTIN = NEXT AVAILABLE CELL IN IPNTSD                    STOSDW 00025
C              IPNTOT = FIRST CURRENTLY VALID CELL IN IPNTSD             STOSDW 00026
C              IPNTLS = DIMENSION OF IPNTSD                              STOSDW 00027
C                                                                        STOSDW 00028
      COMMON / KERN / ERR,MXSKRN,IPKERN,NFLKRN,NEPATK,NROWEA             KERN   00002
      COMMON /ARRAYS/ KBXCDW,LBXCDW,LBOXC,KBXCDT,LBXCDT,KJALPH,LJALPH,   ARRAYS 00002
     1                KALPHA,KKERNL,LKERNL,KPNTRM,LPNTRM,KDEFSL,KELPHI,  ARRAYS 00003
     2                LMODES,KPNTSD,LPNTSD,KSDW,LSDW,KPNTDW,LPNTDW,      ARRAYS 00004
     3                KDW,LDW,KTVP,LTVP                                  ARRAYS 00005
      COMMON /SNWASH/ IPNTSD(2,50), ENSUBD(2,600),  IPNTIN,IPNTOT,IPNTLS SNWASH 00002
C                    IPNTSD(LPNTSD), ENSUBD(2*LSDW)                      SNWASH 00003
      COMPLEX ENSUBD                                                     SNWASH 00004
      COMMON /CHECKPR/ DPPCPR,GEOCPR,MODCPR,AICCPR,NWSCPR,SMCPR,GAFCPR   CHECKPR 00002
      LOGICAL  DPPCPR, GEOCPR, MODCPR, AICCPR, NWSCPR,  SMCPR, GAFCPR    CHECKPR 00003
      EQUIVALENCE (CHECKPR,NWSCPR)                                       STOSDW 00033
      LOGICAL CHECKPR                                                    STOSDW 00034
      DIMENSION TITL(3)                                                  STOSDW 00035
C                                                                        STOSDW 00036
C                                                                        STOSDW 00037
      COMPLEX EN(2)                                                      STOSDW 00038
C                                                                        STOSDW 00039
      IRR = 0                                                            STOSDW 00040
C        IS THIS THE INITIAL CALL -                                      STOSDW 00041
      IF (IROW .EQ. IXB .AND. JCOL .EQ. 1) GO TO 700                     STOSDW 00042
C        NO.  IS A NEW ROW BEING CONSIDERED -                            STOSDW 00043
      IF (IROW .GT. IOROW) GO TO 200                                     STOSDW 00044
C        NO.  GET THE LOCATION FOR THE VALUE IN THE SUBDIVIDED DOWN-     STOSDW 00045
C             WASH ARRAY                                                 STOSDW 00046
      IJ = LOCSDW(IROW,JCOL, IPNTSD,IPNTIN,IPNTOT,IPNTLS)                STOSDW 00047
      IF (IJ) 900,900,550                                                STOSDW 00048
C                                                                        STOSDW 00049
C        MUST UPDATE POINTERS AND ADD A ROW TO THE SUBDIVIDED BOX ARRAY  STOSDW 00050
  200 CONTINUE                                                           STOSDW 00051
      IOROW = IROW                                                       STOSDW 00052
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C         SET THE NEXT VALUES OF THE POINTER ARRAY (1 ROW)                STOSDW  00053
C         INCREMENT IPNTIN, ALLOWING FOR END-AROUND INCREMENTAL           STOSDW  00054
      INM1 = IPNTIN                                                       STOSDW  00055
      I1 = IPNTSD(1,IPNTIN)                                               STOSDW  00056
      CALL POINTR (IROW, 1,MYB, .T.,.T., IBOX,LBXCD, IPNTLS,              STOSDW  00057
     1            I1, IPNTIN,IPNTSD)                                      STOSDW  00058
C                                                                         STOSDW  00059
C         LOOP INCREMENTING IPNTOT, IF OVER-LAP OCCURS.                   STOSDW  00060
  220 CONTINUE                                                            STOSDW  00061
      IF (IPNTIN-IPNTOT) 230,225,235                                      STOSDW  00062
  225 IPNTOT = MOD(IPNTOT,IPNTLS) +1                                      STOSDW  00063
      GO TO 220                                                           STOSDW  00064
  230 ISROWS = IPNTIN-IPNTOT+IPNTLS                                       STOSDW  00065
      GO TO 240                                                           STOSDW  00066
  235 ISROWS = IPNTIN-IPNTOT                                              STOSDW  00067
  240 CONTINUE                                                            STOSDW  00068
      IF (ISROWS .GT. MXSKRN) IPNTOT = MOD(IPNTOT+ISROWS-MXSKRN-1,        STOSDW  00069
     1     IPNTLS) + 1                                                    STOSDW  00070
C                                                                         STOSDW  00071
C         KEEP SUBDIVIDED DOWNWASHES END-AROUND.                          STOSDW  00072
C         WAS THE ARRAY LIMIT BEEN EXCEEDED -                             STOSDW  00073
      IOLD = IPNTSD(1,INM1)                                               STOSDW  00074
      IF (IPNTSD(1,IPNTIN) .LE. LSTW + 1) GO TO 405                       STOSDW  00075
C         LIMIT EXCEEDED BY CURRENT ROW. PLACE AT BEGINNING OF THE ARRAY  STOSDW  00076
      IF (.NOT. CHECKPR) GO TO 400                                        STOSDW  00077
      TITL(1) = 10HEN SUBDIVI                                             STOSDW  00078
      TITL(2) = 10HDED, UPPER                                             STOSDW  00079
      TITL(3) = 10H, PARTIAL                                              STOSDW  00080
      IF (IPNTIN .LT. IPNTOT) GO TO 395                                   STOSDW  00081
      CALL PRINTR(TITL,0,ENSUBD,2,IPNTOT,IPNTIN-1,MYB,IPNTSD)             STOSDW  00082
      GO TO 400                                                           STOSDW  00083
  395 CALL PRINTR(TITL,0,ENSUBD,2,IPNTOT,IPNTLS-1, MYB,IPNTSD)            STOSDW  00084
      CALL PRINTR(TITL,0,ENSUBD,2, 1,  IPNTIN-1,   MYB,IPNTSD)           STOSDW  00085
  400 CONTINUE                                                            STOSDW  00086
      IPNTSD(1,IPNTIN) = IPNTSD(1,IPNTIN) - IOLD + 1                      STOSDW  00087
      IPNTSD(1,INM1) = 1                                                  STOSDW  00088
C                                                                         STOSDW  00089
  405 CONTINUE                                                            STOSDW  00090
      IPM = IPNTSD(1,INM1)                                                STOSDW  00091
      IPI = IPNTSD(1,IPNTIN)                                              STOSDW  00092
      IPO = IPNTSD(1,IPNTOT)                                              STOSDW  00093
C                                                                         STOSDW  00094
      IF (IOLD .GT. IPO) GO TO 430                                        STOSDW  00095
C                                                                         STOSDW  00096
C         ARRAY WAS ALREADY END-AROUND PRIOR TO LATEST ADDITION           STOSDW  00097
      IF (IOLD .EQ. IPM) GO TO 440                                        STOSDW  00098
C         ADDED ROW WENT END-AROUND AS WELL                               STOSDW  00099
  410 IPNTOT = MOD(IPNTOT,IPNTLS) + 1                                     STOSDW  00100
      IF (IPNTSD(1,IPNTOT) .NE. 1 )  GO TO 410                            STOSDW  00101
      IPNTOT = MOD(IPNTOT,IPNTLS) + 1                                     STOSDW  00102
      IPO = IPNTSD(1,IPNTOT)                                              STOSDW  00103
      GO TO 440                                                           STOSDW  00104
C                                                                         STOSDW  00105
C         ARRAY WAS SEQUENTIAL.  CHECK WHETHER IT HAS GONE END-AROUND     STOSDW  00106
  430 CONTINUE                                                            STOSDW  00107
      IF (IOLD .EQ. IPM) GO TO 500                                        STOSDW  00108
C         IT HAS GONE END-AROUND                                          STOSDW  00109
```

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C                                                                       STOSDW  00110
  440 CONTINUE                                                          STOSDW  00111
C         HAS THE ARRAY BEEN OVER-WRITTEN IN GOING END-AROUND -         STOSDW  00112
      IF (IPO .GT. IPI) GO TO 500                                       STOSDW  00113
C         YES.  MOVE IPNTOT UNTIL CLEAR.                                STOSDW  00114
      IPNTOT = MOD(IPNTOT,IPNTLS) + 1                                   STOSDW  00115
      IPO = IPNTSD(1,IPNTOT)                                            STOSDW  00116
      IF (IPO .NE. 1) GO TO 440                                         STOSDW  00117
C                                                                       STOSDW  00118
C         ALL POINTERS HAVE BEEN RESET.  GET LOCATION                   STOSDW  00119
  500 CONTINUE                                                          STOSDW  00120
      IJ = LOCSDW(IROW,JCOL, IPNTSD,IPNTIN,IPNTOT,IPNTLS)               STOSDW  00121
      IF (IJ .EQ. 0) GO TO 900                                          STOSDW  00122
C                                                                       STOSDW  00123
C         STORE THE DOWNWASH VALUE                                      STOSDW  00124
  550 CONTINUE                                                          STOSDW  00125
      ENSUBD(1,IJ) = EN(1)                                              STOSDW  00126
      ENSUBD(2,IJ) = EN(2)                                              STOSDW  00127
  600 RETURN                                                            STOSDW  00128
C                                                                       STOSDW  00129
C                                                                       STOSDW  00130
C         INITIAL CALL                                                  STOSDW  00131
  700 CONTINUE                                                          STOSDW  00132
      IPNTOT = MOD(IXB-1,IPNTLS) + 1                                    STOSDW  00133
      IPNTIN = IPNTOT                                                   STOSDW  00134
      MX     = MIND(MXBS-IXB+1,  MXSKRN,  IPNTLS-1)                    STOSDW  00135
C         SET UP POINTER ARRAY FOR FIRST PASS                           STOSDW  00136
      CALL POINTR(IXB, MX,MYB, .T., .T., IBOX,LBXCD, IPNTLS,            STOSDW  00137
     1     1, IPNTIN, IPNTSD)                                           STOSDW  00138
  720 CONTINUE                                                          STOSDW  00139
      IF (IPNTSD(1,IPNTIN) .LE. LSDW ) GO TO 730                        STOSDW  00140
      IPNTIN = IPNTIN - 1                                               STOSDW  00141
      MX = MX - 1                                                       STOSDW  00142
      GO TO 720                                                         STOSDW  00143
  730 CONTINUE                                                          STOSDW  00144
      IOROW = MX + IXB - 1                                              STOSDW  00145
C                                                                       STOSDW  00146
      ENSUBD(1,1) = EN(1)                                               STOSDW  00147
      ENSUBD(2,1) = EN(2)                                               STOSDW  00148
      GO TO 600                                                         STOSDW  00149
C                                                                       STOSDW  00150
C         ERROR                                                         STOSDW  00151
  900 IRR = 1                                                           STOSDW  00152
      GO TO 600                                                         STOSDW  00153
C                                                                       STOSDW  00154
      END                                                               STOSDW  00155
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      SUBROUTINE PRINTR( TITL,IMODE,ARRAY,K,IXB,MXB,MYB,IPNTRM)          PRNTNW  00002
C                                                                        PRNTNW  00003
C         TITL   - TITLE TO PRINT FOR THE ARRAY                          PRNTNW  00004
C         IMODE  - MODE SHAPE NUMBER                                     PRNTNW  00005
C         ARRAY  - ARRAY TO BE PRINTED                                   PRNTNW  00006
C                                                                        PRNTNW  00007
      DIMENSION ARRAY(K,1), TITL(3)                                      PRNTNW  00008
      COMPLEX ARRAY                                                      PRNTNW  00009
      DIMENSION IPNTRM(2,50)                                             PRNTNW  00010
      COMMON /CONTRL/ PREVEX,OMACH, TITLE(8), PRVGEOM,PRVMODE,DIHW,DIHT, CONTRL  00002
     1               DEFAULT                                             CONTRL  00003
      LOGICAL     PRVGEOM,PRVMODE,DIHW,DIHT,DEFAULT                      CONTRL  00004
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,     PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                                PROBLM  00003
      LOGICAL         SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                  PROBLM  00004
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,          FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC           FILES   00003
      COMMON /KVAL  / IKVAL,XKVAL(20), XKS(20)                           KVAL    00002
      DIMENSION PC(2)                                                    PRNTNW  00016
      DIMENSION S(50),D(50)                                              PRNTNW  00020
      EQUIVALENCE (S(1),BUFF(1)),(D(1),BUFF(1251))                       PRNTNW  00021
      REAL K1                                                            PRNTNW  00022
      INTEGER PAGE                                                       PRNTNW  00023
      COMMON /RWBUFF/ BFCODE,IBFCNT,  BUFF(3280)                         RWBUFF  00002
      DATA   PC    / 1OHPAGE CONTI,4HNUED /                              FTN01   00063
      DATA   BLANK / 1H  /                                               FTN01   00064
      DATA   XINIT / -1.0 /                                              FTN01   00065
      K1 = XKVAL(IKVAL)                                                  PRNTNW  00024
      IF(XKS(IKVAL).NE.XINIT) K1 = XKS(IKVAL)                            PRNTNW  00025
C                                                                        PRNTNW  00026
C                                                                        PRNTNW  00027
      PAGE = 0                                                           PRNTNW  00028
      N =1                                                               PRNTNW  00029
      M =4                                                               PRNTNW  00030
      IF(M.GT.MYB) M = MYB                                               PRNTNW  00031
  100 LINE = 100                                                         PRNTNW  00032
  200 DO 1400 I = IXB,MXB                                                PRNTNW  00033
      DO 300 J=N,M                                                       PRNTNW  00034
      S(J) = 0.0                                                         PRNTNW  00035
      D(J) = 0.0                                                         PRNTNW  00036
  300 CONTINUE                                                           PRNTNW  00037
      IF(LINE.LE.50) GO TO 900                                           PRNTNW  00038
      PAGE = PAGE + 1                                                    PRNTNW  00039
      LINE = 4                                                           PRNTNW  00040
      WRITE (NT6,9001) TITLE,TITL, XMACH, K1, IMODE                      PRNTNW  00041
C                                                                        PRNTNW  00042
      IF(PAGE.EQ.1) GO TO 700                                            PRNTNW  00043
      WRITE (NT6,9005) PC                                                PRNTNW  00044
      GO TO 800                                                          PRNTNW  00045
  700 WRITE(NT6,9005)                                                    PRNTNW  00046
  800 CONTINUE                                                           PRNTNW  00047
      WRITE(NT6,6006) (BLANK,J,J=N,M)                                    PRNTNW  00048
      WRITE(NT6,6007) (BLANK,  J=N,M)                                    PRNTNW  00049
  900 CONTINUE                                                           PRNTNW  00050
      JS = IPNTRM(2,I)                                                   PRNTNW  00051
      IF (JS .LE. 0) GO TO 1400                                          PRNTNW  00052
      IDX = IPNTRM(1,I)                                                  PRNTNW  00053
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      JE =IPNTRM(1,I+1) - IDX + JS -1                                    PRNTNW  00054
      IF(JE.EQ.0) GO TO 1400                                             PRNTNW  00055
      DO 1000 J=JS,JE                                                    PRNTNW  00056
      S(J) =  REAL(ARRAY(1,IDX) )                                        PRNTNW  00057
      D(J) = AIMAG(ARRAY(1,IDX) )                                        PRNTNW  00058
      IDX = IDX +1                                                       PRNTNW  00059
 1000 CONTINUE                                                           PRNTNW  00060
      DO 1200 J=N,M                                                      PRNTNW  00061
      IF(S(J)) 1300,1100,1300                                            PRNTNW  00062
 1100 CONTINUE                                                           PRNTNW  00063
      IF(D(J)) 1300,1200,1300                                            PRNTNW  00064
 1200 CONTINUE                                                           PRNTNW  00065
      GO TO 1400                                                         PRNTNW  00066
 1300 WRITE (NT6,9013) I,(S(J),D(J),J=N,M)                               PRNTNW  00067
      LINE = LINE + 1                                                    PRNTNW  00068
 1400 CONTINUE                                                           PRNTNW  00069
      M = M+4                                                            PRNTNW  00070
      N = N+4                                                            PRNTNW  00071
      IF(N.GT.MYB ) GO TO 1500                                           PRNTNW  00072
      IF(M.GT.MYB ) M=MYB                                                PRNTNW  00073
      IF(LINE.GT.45) GO TO 100                                           PRNTNW  00074
      WRITE(NT6,6006) (BLANK,J,J=N,M)                                    PRNTNW  00075
      WRITE(NT6,6007) (BLANK,  J=N,M)                                    PRNTNW  00076
      LINE = LINE+3                                                      PRNTNW  00077
      GO TO 200                                                          PRNTNW  00078
 1500 CONTINUE                                                           PRNTNW  00079
      RETURN                                                             PRNTNW  00080
 9001 FORMAT(1H1,20X,8A10/ 50X,3A10/ 46X, 'H( MACH F5.3,5X,10HRED. FREQ.  PRNTNW  00081
     1    *=*,F8.5, * )* /52X,*MODE   SHAPE* ,I3)                        PRNTNW  00082
 9005 FORMAT(44X,42(1H-),20X,A10,A4)                                     PRNTNW  00083
 6006 FORMAT(4HORDN, A1,14X,5HCHORD,I3, 3(A1,22X,5HCHORD,I3) )           PRNTNW  00084
 6007 FORMAT(3X, 4(A1,9X,4HREAL,8X,9H(MAGINARY) )                        PRNTNW  00085
 9013 FORMAT(I4,8E16.8)                                                  PRNTNW  00086
      END                                                                PRNTNW  00087
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      SUBROUTINE DCODER(IBOX,LBOX, IA,JA,  IL,JL,  SUBD, ICODE)          DCODNW 00002
      DIMENSION  IBOX(LBOX,1), ICODE(1)                                  DCODNW 00003
C                                                                        DCODNW 00004
C         IBOX   - ARRAY OF BOX CODES IN PACKED WORD FORMAT              DCODNW 00005
C         LBOX   - ROW DIMENSION OF BOX CODES ARRAY                      DCODNW 00006
C         IA     - I-TH INDEX OF FIRST CODE TO RETRIEVE                  DCODNW 00007
C         JA     - J-TH INDEX OF FIRST CODE TO RETRIEVE                  DCODNW 00008
C         IL     -  LAST BOX CODE ON THE JA-TH CHORD TO RETRIEVE         DCODNW 00009
C         JL     -  LAST BOX ON THE IA-TH ROW TO RETRIEVE                DCODNW 00010
C         SUBD   - .T., SUBDIVIDED BOX CODES DESIRED, .F. UNSUBDIVIDED.  DCODNW 00011
C         ICODE  - ARRAY INTO WHICH BOX CODE WILL BE STORED.             DCODNW 00012
C                                                                        DCODNW 00013
C         COMMENT ON USAGE                                               DCODNW 00014
C             BOX CODES CAN BE RETRIEVED FOR ONE BOX, A ROW OR PART OF   DCODNW 00015
C         A ROW, OR A COLUMN OR PART OF A COLUMN. A ROW AND COLUMN CAN   DCODNW 00016
C         NOT BE RETRIEVED AT THE SAME TIME. IF ONLY 1 BOX IS DESIRED    DCODNW 00017
C         SET  IL = IA AND  JL = JA.   IF BOTH  IL .NE. IA AND  JL .NE.  DCODNW 00018
C         JA, ONE ROW WILL BE RETURNED,  IL BEING IGNORED.               DCODNW 00019
C                                                                        DCODNW 00020
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,          GEOMTY 00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,              GEOMTY 00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,         GEOMTY 00004
     3                IXBW,XCENTR                                       GEOMTY 00005
      LOGICAL COPLAN                                                     GEOMTY 00006
      LOGICAL SUBD                                                       DCODNW 00022
      INTEGER SHIFT                                                      DCODNW 00023
      DATA NBWRD /20/                                                    DCODNW 00024
      MASK = 7                                                           DCODNW 00025
      IB = 1                                                             DCODNW 00026
      IF (SUBD) GO TO 50                                                 DCODNW 00027
      I = NSUBDV * (IA-1) + IXBW                                         DCODNW 00028
      J = NSUBDV * (JA-1) + NSUBCN                                       DCODNW 00029
      ISKIP = NSUBDV                                                     DCODNW 00030
      IEND = NSUBDV * (IL-1) + IXBW                                      DCODNW 00031
      JEND = NSUBDV * (JL-1) + NSUBCN                                    DCODNW 00032
      GO TO 60                                                           DCODNW 00033
   50 CONTINUE                                                           DCODNW 00034
      I = IA                                                             DCODNW 00035
      J = JA                                                             DCODNW 00036
      ISKIP = 1                                                          DCODNW 00037
      IEND = IL                                                          DCODNW 00038
      JEND = JL                                                          DCODNW 00039
   60 CONTINUE                                                           DCODNW 00040
      IF (JL  .EQ. JA) GO TO 1100                                        DCODNW 00041
C                                                                        DCODNW 00042
C         PROGRAM WILL RETRIEVE NI BOXES FROM ROW I                      DCODNW 00043
  100 CONTINUE                                                           DCODNW 00044
      DO 1000 JJ = J,JEND,ISKIP                                          DCODNW 00045
      JSB =(JJ-1)/NBWRD + 1                                              DCODNW 00046
      IJWORD = IBOX(I,JSB)                                               DCODNW 00047
      JB = (NBWRD - MOD(JJ,NBWRD) ) * 3                                  DCODNW 00048
      IF(JB.EQ.60) JB = 0                                                DCODNW 00049
C         JB = NUMBER OF BITS TO SHIFT LEFT.                             DCODNW 00050
      IJMASK= SHIFT(MASK,JB)                                             DCODNW 00051
      IJCODE =   IJWORD.AND.IJMASK                                       DCODNW 00052
      NJB = -JB                                                          DCODNW 00053
      ICODE(IB) = SHIFT(IJCODE,NJB)                                      DCODNW 00054
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      IB = IB + 1                                                    DCODNW  00055
 1000 CONTINUE                                                       DCODNW  00056
      GO TO 3000                                                     DCODNW  00057
C                                                                    DCODNW  00058
C         PROGRAM WILL RETRIEVE NJ BOXES FROM CHORD J                DCODNW  00059
 1100 CONTINUE                                                       DCODNW  00060
      JSB  = (J-1)/NBWRD + 1                                         DCODNW  00061
      JB = (NBWRD - MOD(J,NBWRD) ) * 3                               DCODNW  00062
      IF(JB.EQ.60) JB = 0                                            DCODNW  00063
      IJMASK = SHIFT(MASK,JB)                                        DCODNW  00064
      NJB = -JB                                                      DCODNW  00065
      DO 2000 II = I,IEND,ISKIP                                      DCODNW  00066
      IJWORD = IBOX(II,JSB)                                          DCODNW  00067
      IJCODE = IJWORD.AND.IJMASK                                     DCODNW  00068
      ICODE(IB) = SHIFT(IJCODE,NJB)                                  DCODNW  00069
      IB = IB + 1                                                    DCODNW  00070
 2000 CONTINUE                                                       DCODNW  00071
C                                                                    DCODNW  00072
 3000 CONTINUE                                                       DCODNW  00073
      RETURN                                                         DCODNW  00074
      END                                                            DCODNW  00075
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      SUBROUTINE POINTR( IX,MX, MYB,          SUBD, DIAPH, IBOX,LBXCD,    POINTR  00002
     1                   MXIR,  IPOINT,IPNTIN,IPNTR )                     POINTR  00003
C                                                                          POINTR  00004
C        GENERATES A POINTER ARRAY WHICH SERVES AS AN INDEX TO A           POINTR  00005
C        CONDENSED ARRAY OF BOX VALUES (MODES, DOWNWASHES, ETC.)           POINTR  00006
C                                                                          POINTR  00007
C        IX     = CENTER OF FIRST BOX TO USE                               POINTR  00008
C        MX     = NUMBER OF ROWS TO PROCESS                                POINTR  00009
C        MYB    = MAXIMUM ROW LENGTH                                       POINTR  00010
C        SUBD   = .T., SUBDIVIDED BOXES TO BE USED                         POINTR  00011
C               = .F., UNSUBDIVIDED BOXES TO BE USED                       POINTR  00012
C        DIAPH  = .T.,DIAPHRAGMS TO BE INCLUDED                            POINTR  00013
C               = .F., ONLY PLANFORM BOXES                                 POINTR  00014
C        IBOX   = ARRAY OF BOX CODES                                       POINTR  00015
C        LBXCD  = ROW DIMENSION OF BOX CODES ARRAY                         POINTR  00016
C        MXIR   = SIZE OF IPNTR ARRAY                                      POINTR  00017
C        IPOINT = VALUE TO BE USED FOR FIRST POINTER (NORMALLY 1)          POINTR  00018
C     IN/OUT -                                                             POINTR  00019
C        IPNTIN = LOCATION OF NEXT ABAILABLE LOCATION IN IPNTR ARRAY       POINTR  00020
C                 (OVERLAP OF TAIL IS ACCOUNTED FOR HERE.)                 POINTR  00021
C     OUTPUTS -                                                            POINTR  00022
C        IPNTR  = POINTER ARRAY - OUTPUT FROM THE SUBROUTINE               POINTR  00023
C             IPNTR(1,I) = LOCATION OF THE FIRST VALUE FOR ROW I           POINTR  00024
C             IPNTR(2,I) = CHORD LOCATION (SUBSCRIPT J) OF THAT VALUE      POINTR  00025
C                                                                          POINTR  00026
C   COMMON VALUES USED -                                                   POINTR  00027
C                                                                          POINTR  00028
C                                                                          POINTR  00029
      DIMENSION IBOX(LBXCD,1),  IPNTR(2,1), ICODE(150)                     POINTR  00030
      LOGICAL   DIAPH,SUBD,WING                                            POINTR  00031
C                                                                          POINTR  00032
      ITOTBX = IPOINT                                                      POINTR  00033
      IL = IX + MX - 1                                                     POINTR  00034
      DO 100 IROW = IX,IL                                                  POINTR  00035
      IPBSUM=0                                                             POINTR  00036
      IUISUM=0                                                             POINTR  00037
      IPBX=1                                                               POINTR  00038
      IBXSUM = 0                                                           POINTR  00039
      CALL DCODER(IBOX,LBXCD, IROW,1, IROW,MYB, SUBD, ICODE)               POINTR  00040
C                                                                          POINTR  00041
C        FIND LAST BOX ON ROW                                              POINTR  00042
      M = MYB                                                              POINTR  00043
      IF (DIAPH) GO TO 20                                                  POINTR  00044
C        ONLY PLANFORM BOXES DESIRED                                       POINTR  00045
      DO 15 JCOL = 1,MYB                                                   POINTR  00046
      IF (ICODE(M) .EQ. 1) GO TO 30                                        POINTR  00047
      M = M - 1                                                            POINTR  00048
   15 CONTINUE                                                             POINTR  00049
      GO TO 92                                                             POINTR  00050
C        PLANFORM AND DIAPHRAGM DESIRED                                    POINTR  00051
   20 CONTINUE                                                             POINTR  00052
      DO 25 JCOL = 1,MYB                                                   POINTR  00053
      IF (ICODE(M) .NE. 0) GO TO 30                                        POINTR  00054
      M = M - 1                                                            POINTR  00055
   25 CONTINUE                                                             POINTR  00056
      GO TO 92                                                             POINTR  00057
C                                                                          POINTR  00058
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C         LOOP ON CHORDS IN THE ROW
   30 CONTINUE
      DO 90 JCOL = 1,M
      IF (ICODE(JCOL) - 1) 35,40,50
C
C         ICODE = 0
C
   35 IF(IDISUM.NE.0) GO TO 40
      IPBX = IPBX + 1
      GO TO 90
C
C         ICODE = 1
   40 IPBSUM = IDISUM + 1
C
C         ICODE = 2 OR 3
   50 CONTINUE
      IDISUM = IDISUM + 1
   90 CONTINUE
C
   92 CONTINUE
      IPNTR(1,IPNTIN) = ITOTBX
      IPNTR(2,IPNTIN) =  IPBX
      IPNTIN =  MOD(IPNTIN,MXIR) + 1
      IF(DIAPH) GO TO 95
      ITOTBX = ITOTBX +IPBSUM
      GO TO 100
   95 ITOTBX =ITOTBX + IDISUM
  100 CONTINUE
      IPNTR(1,IPNTIN) = ITOTBX
      IPNTR(2,IPNTIN) = 0
      RETURN
      END
```

```
POINTR  00059
POINTR  00060
POINTR  00061
POINTR  00062
POINTR  00063
POINTR  00064
POINTR  00065
POINTR  00066
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POINTR  00082
POINTR  00083
POINTR  00084
POINTR  00085
POINTR  00086
POINTR  00087
POINTR  00088
POINTR  00089
POINTR  00090
```

```
      FUNCTION LOCSDW(IROW,JCOL,IPNTSD,IPNTIN,IPNTOT,IPNTLS)                LOCSDW  00002
C                                                                           LOCSDW  00003
C         RETURNS THE LOCATION OF THE WORD IN THE END-AROUND SUBDIVIDED     LOCSDW  00004
C         DOWNWASH ARRAY CORRESPONDING TO BOX(IROW,JCOL) OF THE SUB-        LOCSDW  00005
C         DIVIDED BOX ARRAY                                                 LOCSDW  00006
C                                                                           LOCSDW  00007
C              IROW   = BOX CHORDWISE LOCATION                              LOCSDW  00008
C              JCOL   = BOX SPANWISE LOCATION                               LOCSDW  00009
C              IPNTSD = ARRAY OF POINTERS                                   LOCSDW  00010
C              IPNTIN = NEXT AVAILABLE (UNUSED) CELL IN IPNTSD (END-        LOCSDW  00011
C                       AROUND)                                             LOCSDW  00012
C              IPNTOT = FIRST CURRENTLY AVAILABLE CELL IN IPNTSD            LOCSDW  00013
C              IPNTLS = LAST CELL OF IPNTSD (LENGTH OF ARRAY)               LOCSDW  00014
C         RETURN -                                                          LOCSDW  00015
C              LOCSDW = LOCATION OF DESIRED DOWNWASH, IF SUCCESSFUL         LOCSDW  00016
C                     = 0, IF LOCPNT LIES OUTSIDE THE DEFINED AREA.         LOCSDW  00017
C                                                                           LOCSDW  00018
      DIMENSION IPNTSD(2,IPNTLS)                                            LOCSDW  00019
C                                                                           LOCSDW  00020
      LOCPNT = MOD(IROW-1,IPNTLS) + 1                                       LOCSDW  00021
C             LOCPNT = LOCATION OF CELL IN IPNTSD WHICH WAS OR IS TO BE     LOCSDW  00022
C                      USED                                                 LOCSDW  00023
      IF(IPNTIN - IPNTOT) 100, 300, 200                                     LOCSDW  00024
C         END AROUND HAS OCCURRED                                           LOCSDW  00025
  100 IF (LOCPNT - IPNTIN) 400, 300, 150                                    LOCSDW  00026
C         NOT IN UPPER PART. IS LOCPNT WITHIN BOTTOM PART -                 LOCSDW  00027
  150 IF (LOCPNT - IPNTOT) 300, 400, 400                                    LOCSDW  00028
C                                                                           LOCSDW  00029
C         NO END AROUND, NORMAL SEQUENCE                                    LOCSDW  00030
  200 IF (LOCPNT - IPNTIN) 250, 300, 300                                    LOCSDW  00031
C         LESS THAN UPPER LIMIT. IS LOCPNT .GE. LOWER LIMIT -               LOCSDW  00032
  250 IF (LOCPNT .GE. IPNTOT) GO TO 400                                     LOCSDW  00033
C                                                                           LOCSDW  00034
C         ERROR OR INITIAL CONDITION ENCOUNTERED (SHOULD NEVER OCCUR)       LOCSDW  00035
  300 LOCSDW = 0                                                            LOCSDW  00036
      GO TO 500                                                             LOCSDW  00037
C                                                                           LOCSDW  00038
C         SUCCESSFUL, BOX HAS BEEN DEFINED                                  LOCSDW  00039
  400 IFB = IPNTSD(2,LOCPNT)                                                LOCSDW  00040
      IF(JCOL.LT.IFB) GO TO 300                                             LOCSDW  00041
      LOCSDW = IPNTSD(1,LOCPNT) + JCOL-IFB                                  LOCSDW  00042
C                                                                           LOCSDW  00043
  500 CONTINUE                                                              LOCSDW  00044
      RETURN                                                                LOCSDW  00045
      END                                                                   LOCSDW  00046
```

```
      SUBROUTINE SMPLW( IBOX,LBXCD, JCHRD, JT, IFRST,ILAST)                SMPLW  00002
C                                                                          SMPLW  00003
C         COMPUTES DOWNWASH, SIDEWASH AND VELOCITY POTENTIAL FOR A         SMPLW  00004
C         SAMPLE CHORD LOCATED IN THE WING FLOW FIELD                      SMPLW  00005
C                                                                          SMPLW  00006
C              IBOX   = ARRAY OF BOX CODES FOR THE WING                    SMPLW  00007
C              LBXCD  = LENGTH OF BOX CODE ARRAY                           SMPLW  00008
C              JCHRD  = SAMPLE-WASH CHORD NUMBER                           SMPLW  00009
C              JT     = J-LOCATION OF THE CHORD                            SMPLW  00010
C              IFRST  = NUMBER OF FIRST SAMPLE BOX                         SMPLW  00011
C              ILAST  = NUMBER OF LAST SAMPLE BOX                          SMPLW  00012
C                                                                          SMPLW  00013
      DIMENSION IBOX(LBXCD,1)                                              SMPLW  00014
      COMMON /CONTRL/ PREVEX,CMACH, TITLE(8), PRVGEOM,PRVMODE,DIHW,DIHT,   CONTRL  00002
     1                DEFAULT                                              CONTRL  00003
      LOGICAL     PRVGEOM,PRVMODE,DIHW,DIHT,DEFAULT                        CONTRL  00004
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,       PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                                  PROBLM  00003
      LOGICAL         SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                    PROBLM  00004
      COMMON /SNWASH/ IPNTSD(2,50), ENSUBD(2,600),  IPNTIN,IPNTOT,IPNTLS   SNWASH  00002
C                    IPNTSD(LPNTSD), ENSUBD(2*LSDW)                        SNWASH  00003
      COMPLEX ENSUBD                                                       SNWASH  00004
      COMMON /MUAICS/ YBAR,EL,MUAIC(2,50),NROWS,SURF,                      MUAICS  00002
     1                YBARL,ELL, MUAICL(2,50),NROWSL,SURFL,PSIDIF          MUAICS  00003
      LOGICAL SURF,SURFL                                                   MUAICS  00004
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,            GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,                 GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,            GEOMTY  00004
     3                IXBW,XCENTR                                          GEOMTY  00005
      LOGICAL COPLAN                                                       GEOMTY  00006
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,            FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC             FILES   00003
      COMMON /IOCONT/ OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,         IOCONT  00002
     1                PRPAIC,PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,          IOCONT  00003
     2                PRBL,PRDCP,PRGNAF,PRGNAC,PRSL,PRLW,PRNW,PRCM         BCSFRB  00001
      EQUIVALENCE (PRUW,PRDW)                                              IOCONT  00005
      LOGICAL   OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,PRPAIC,        IOCONT  00006
     1          PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,PRBL,PRSL,PRGNAF,      IOCONT  00007
     2          PRDCP,PRGNAC,PRUW,PRLW,PRNW,PRCM                           BCSFRB  00002
      COMMON / MODES/ SYM,SYMT,MTYPEW,MTYPET                               MODCOM  00002
      COMMON /NWASHES/ IPNTDW(2,100),ENRUS(1275), ENRLS(1275),IOVLAPN      NWSHES  00002
      COMPLEX                        ENRUS,       ENRLS                    NWSHES  00003
      COMMON /AICS  / XKVL,   C(1640),W(1640),V(1640)                      AICS    00002
      COMPLEX         C,      W,      V                                    AICS    00003
      COMPLEX DW(52),SW(50),LW(50),PHI(50)                                 SMPLW  00025
      EQUIVALENCE (SW,IPNTSD),(LW,ENSUBD),(DW,ENSUBD(1,26))                SMPLW  00026
      EQUIVALENCE (PHI,ENSUBD(1,52))                                       SMPLW  00027
      COMPLEX WSUM,VSUM,PHISUM, EN                                         SMPLW  00028
      INTEGER RWT,LWT                                                      SMPLW  00029
      DATA RWT,LWT / 3,4 /                                                 SMPLW  00030
C                                                                          SMPLW  00031
C         SET CONSTANTS                                                    SMPLW  00032
      CPSI = COS(PSIW)                                                     SMPLW  00033
      SPSI = SIN(PSIW)                                                     SMPLW  00034
      BINV = 1./B1                                                         SMPLW  00035
C                                                                          SMPLW  00036
C         COMPUTE THE RIGHT WING CONTRIBUTION TO THE SAMPLE CHORD          SMPLW  00037
```

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C                                                                       SMPLW  00038
C         GET THE NECESSARY AIC ARRAYS                                  SMPLW  00039
      CALL GETAIC(JCHRD,RWT, 0, IR)                                     SMPLW  00040
      IF (IR .NE. 0) GO TO 800                                          SMPLW  00041
      YMUBAR = ( JT-.5 + EL*SPSI) / CPSI                                SMPLW  00042
      JBAR  = YMUBAR                                                    SMPLW  00043
      IF (YMUBAR .GE. 0) JBAR = JBAR + 1                                SMPLW  00044
      NUBMIN = ABS(EL) + .5                                             SMPLW  00045
      IBX = 1                                                           SMPLW  00046
C                                                                       SMPLW  00047
C         LOOP ON BOXES ALONG THE SAMPLE CHORD                          SMPLW  00048
      DO 200 IBXX = IFRST,ILAST                                         SMPLW  00049
      NUBMAX = IBXX -1                                                  SMPLW  00050
      I = IBXX - NUBMIN                                                 SMPLW  00051
C                                                                       SMPLW  00052
C         ZERO OUT THE SUMMATION VARIABLES                              SMPLW  00053
      WSUM = (0.,0.)                                                    SMPLW  00054
      VSUM = (0.,0.)                                                    SMPLW  00055
      PHISUM = (0.,0.)                                                  SMPLW  00056
C                                                                       SMPLW  00057
      IF (YBAR) 120,125,130                                             SMPLW  00058
  120 JINCR = -1                                                        SMPLW  00059
      GO TO 135                                                         SMPLW  00060
  125 IAIC = NUBMIN**2                                                  SMPLW  00061
      INCAIC = 2*NUBMIN + 1                                             SMPLW  00062
      JINCR = 1                                                         SMPLW  00063
      GO TO 140                                                         SMPLW  00064
  130 JINCR = 1                                                         SMPLW  00065
  135 IAIC  = NUBMIN**2 + NUBMIN                                        SMPLW  00066
      INCAIC = 2*NUBMIN + 2                                             SMPLW  00067
  140 CONTINUE                                                          SMPLW  00068
C                                                                       SMPLW  00069
C         LOOP FORWARD OVER THE RIGHT WING                              SMPLW  00070
      DO 190 NUBAR = NUBMIN,NUBMAX                                      SMPLW  00071
      MUAIC1 = MUAIC(1,NUBAR+1)                                         SMPLW  00072
      MUAIC2 = MUAIC(2,NUBAR+1)                                         SMPLW  00073
      IF (MUAIC2 .EQ. 0) GO TO 185                                      SMPLW  00074
      IF (YBAR .GE. 0) GO TO 150                                        SMPLW  00075
      JCOLR = JBAR + NUBAR - MUAIC2 + 1                                 SMPLW  00076
      GO TO 160                                                         SMPLW  00077
  150 JCOLR = JBAR - NUBAR + MUAIC1 - 1                                 SMPLW  00078
  160 CONTINUE                                                          SMPLW  00079
C                                                                       SMPLW  00080
C         LOOP ON A ROW OF WING BOXES, COMPUTING RIGHT WING CONTRIBUTION SMPLW  00081
      DO 180 MUAI = MUAIC1,MUAIC2                                       SMPLW  00082
      IF (JCOLR .LE. 0) GO TO 170                                       SMPLW  00083
      CALL DCODER(IBOX,LBXCD, I,JCOLR, I,JCOLR, .F., ICD)               SMPLW  00084
      IF (ICD .EQ. 0)  GO TO 170                                        SMPLW  00085
C         A CONTRIBUTING BOX HAS BEEN FOUND.  GET THE AIC LOCATION      SMPLW  00086
      KAIC = IAIC + MUAI                                                SMPLW  00087
C         GET THE NORMAL-WASH LOCATION                                  SMPLW  00088
      IDS = LOCSDW( I,JCOLR,  IPNTDW,LPNTDW, 1, LPNTDW)                 SMPLW  00089
C         ADD THIS CONTRIBUTION TO THE SUMS                             SMPLW  00090
      IF (EL .LT. 0) GO TO 163                                          SMPLW  00091
      EN  = ENRUS(IDS)                                                  SMPLW  00092
      GO TO 165                                                         SMPLW  00093
  163 EN  = ENRLS(IDS)                                                  SMPLW  00094
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  165 CONTINUE                                                          SMPLW  00095
      WSUM   = WSUM   + W(KAIC) * EN                                    SMPLW  00096
      VSUM   = VSUM   + V(KAIC) * EN                                    SMPLW  00097
      PHISUM = PHISUM + C(KAIC) * EN                                    SMPLW  00098
  170 CONTINUE                                                          SMPLW  00099
      JCOLR = JCOLR + JINCR                                             SMPLW  00100
  180 CONTINUE                                                          SMPLW  00101
C         END OF LOOP FOR RIGHT WING ROW CONTRIBUTIONS                  SMPLW  00102
C                                                                       SMPLW  00103
  185 CONTINUE                                                          SMPLW  00104
      I = I - 1                                                         SMPLW  00105
      IF (I .LE. 0) GO TO 195                                           SMPLW  00106
      IAIC = IAIC + INCAIC                                              SMPLW  00107
      INCAIC = INCAIC + 2                                               SMPLW  00108
  190 CONTINUE                                                          SMPLW  00109
C         END OF LOOP FORWARD ON RIGHT WING ROWS,  FROM 140*            SMPLW  00110
C                                                                       SMPLW  00111
  195 CONTINUE                                                          SMPLW  00112
      DW(IBX) =  BINV * (CPSI*WSUM + SPSI*VSUM)                         SMPLW  00113
      SW(IBX) =  BINV * (CPSI*VSUM - SPSI*WSUM)                         SMPLW  00114
      PHI(IBX) = PHISUM                                                 SMPLW  00115
      IBX = IBX + 1                                                     SMPLW  00116
  200 CONTINUE                                                          SMPLW  00117
C         END OF LOOP ON RECEIVING BOXES, FOR RIGHT WING CONTRIBUTIONS  SMPLW  00118
C                                                                       SMPLW  00119
      NBXS = IBX - 1                                                    SMPLW  00120
C         IS LEFT WING CONTRIBUTION NEEDED -                            SMPLW  00121
      IF (SYM .EQ. 0) GO TO 310                                         SMPLW  00122
C         YES.  GET THE AIC ARRAYS FOR LEFT WING CONTRIBUTIONS.         SMPLW  00123
      CALL GETAIC(JCHRD, LWT, 0, IR)                                    SMPLW  00124
      IF (IR .NE. 0) GO TO 800                                          SMPLW  00125
      NUBMIN = ABS(EL) + .5                                             SMPLW  00126
      IBX = 1                                                           SMPLW  00127
      YMUBAR = (-JT+.5 + EL*SPSI) / CPSI                                SMPLW  00128
      JBAR  = YMUBAR                                                    SMPLW  00129
      IF (YMUBAR .GE. 0) JBAR = JBAR + 1                                SMPLW  00130
C         LOOP ON BOXES ALONG THE SAMPLE CHORD                          SMPLW  00131
      DO 300 IBXX = IFRST,ILAST                                         SMPLW  00132
      NUBMAX = IBXX - 1                                                 SMPLW  00133
      I = IBXX - NUBMIN                                                 SMPLW  00134
C          ZERO OUT THE SUMMATION VARIABLES                             SMPLW  00135
      WSUM = (0.,0.)                                                    SMPLW  00136
      VSUM = (0.,0.)                                                    SMPLW  00137
      PHISUM = (0.,0.)                                                  SMPLW  00138
C                                                                       SMPLW  00139
      IF (YBAR) 220,225,230                                             SMPLW  00140
  220 JINCR = 1                                                         SMPLW  00141
      GO TO 235                                                         SMPLW  00142
  225 IAIC = NUBMIN**2                                                  SMPLW  00143
      INCAIC = 2*NUBMIN + 1                                             SMPLW  00144
      JINCR  = -1                                                       SMPLW  00145
      GO TO 240                                                         SMPLW  00146
  230 JINCR  = -1                                                       SMPLW  00147
  235 IAIC = NUBMIN**2 + NUBMIN                                         SMPLW  00148
      INCAIC = 2*NUBMIN + 2                                             SMPLW  00149
  240 CONTINUE                                                          SMPLW  00150
C                                                                       SMPLW  00151
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C         LOOP FORWARD OVER THE LEFT WING                                SMPLW  00152
      DO 290 NUBAR = NUBMIN,NUBMAX                                       SMPLW  00153
      MUAIC1 = MUAIC(1,NUBAR+1)                                          SMPLW  00154
      MUAIC2 = MUAIC(2,NUBAR+1)                                          SMPLW  00155
      IF (MUAIC2 .LE. 0) GO TO 285                                       SMPLW  00156
      IF (YBAR .GE. 0) GO TO 250                                         SMPLW  00157
      JCOLL =  JBAR -NUBAR +MUAIC1 -1                                    SMPLW  00158
      GO TO 260                                                          SMPLW  00159
  250 JCOLL =  JBAR +NUBAR -MUAIC1 +1                                    SMPLW  00160
  260 CONTINUE                                                           SMPLW  00161
C                                                                        SMPLW  00162
C         LOOP ON A ROW OF WING BOXES, COMPUTING LEFT WING CONTRIBUTIONS SMPLW  00163
      DO 280 MUAI = MUAIC1,MUAIC2                                        SMPLW  00164
      IF (JCOLL .LE. 0) GO TO 270                                        SMPLW  00165
      CALL DCODER(IBOX,LBXCD, I,JCOLL, I,JCOLL, .F., ICD)                SMPLW  00166
      IF (ICD .EQ. 0) GO TO 270                                          SMPLW  00167
C         A CONTRIBUTING BOX HAS BEEN FOUND.  GET THE AIC LOCATION       SMPLW  00168
      KAIC = IAIC + MUAI                                                 SMPLW  00169
C         GET THE NORMAL-WASH LOCATION                                   SMPLW  00170
      IDS = LOCSDW( I,JCOLL, IPNTDW, LPNTDW, 1, LPNTDW)                  SMPLW  00171
C         ADD THIS CONTRIBUTION TO THE SUMS                              SMPLW  00172
      IF (EL .LT. 0) GO TO 263                                           SMPLW  00173
      EN = ENRUS(IDS)                                                    SMPLW  00174
      GO TO 265                                                          SMPLW  00175
  263 EN = ENRLS(IDS)                                                    SMPLW  00176
  265 CONTINUE                                                           SMPLW  00177
      WSUM   = WSUM   + W(KAIC) * EN                                     SMPLW  00178
      VSUM   = VSUM   + V(KAIC) * EN                                     SMPLW  00179
      PHISUM = PHISUM + C(KAIC) * EN                                     SMPLW  00180
  270 CONTINUE                                                           SMPLW  00181
      JCOLL = JCOLL + JINCR                                              SMPLW  00182
  280 CONTINUE                                                           SMPLW  00183
C         END OF LOOP FOR LEFT WING ROW CONTRIBUTIONS                    SMPLW  00184
C                                                                        SMPLW  00185
  285 CONTINUE                                                           SMPLW  00186
      I = I - 1                                                          SMPLW  00187
      IF (I .LE. 0) GO TO 295                                            SMPLW  00188
      IAIC = IAIC + INCAIC                                               SMPLW  00189
      INCAIC = INCAIC + 2                                                SMPLW  00190
  290 CONTINUE                                                           SMPLW  00191
C         END OF LOOP FORWARD ON LEFT WING ROWS,  FROM 240               SMPLW  00192
C                                                                        SMPLW  00193
C                                                                        SMPLW  00194
  295 CONTINUE                                                           SMPLW  00195
      DW(IBX)   = DW(IBX) + BINV*(CPSI*WSUM - SPSI*VSUM) * SYM           SMPLW  00196
      SW(IBX)   = SW(IBX) + BINV*(CPSI*VSUM + SPSI*WSUM) * SYM           SMPLW  00197
      PHI(IBX) = PHI(IBX) + PHISUM*SYM                                   SMPLW  00198
      IBX = IBX + 1                                                      SMPLW  00199
  300 CONTINUE                                                           SMPLW  00200
C         END OF LOOP ON RECEIVING BOXES, FOR LEFT WING CONTRIBUTIONS    SMPLW  00201
C                                                                        SMPLW  00202
C         DETERMINE WHAT TO PRINT                                        SMPLW  00203
  310 CONTINUE                                                           SMPLW  00204
      WRITE (NT6,6001) TITLE, XMACH,XKVL, JT, IFRST,ILAST                SMPLW  00205
      IF (.NOT. PRDW) GO TO 330                                          SMPLW  00206
      WRITE (NT6,6010                                                    SMPLW  00207
      WRITE (NT6,6011) (DW(I),I = 1,NBXS)                                SMPLW  00208
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  330 CONTINUE                                                          SMPLW  00209
      IF (.NOT. PRSW) GO TO 340                                         SMPLW  00210
      WRITE (NT6,6011)                                                  SMPLW  00211
      WRITE (NT6,6013) (SW(I),I = 1,NBXS)                               SMPLW  00212
  340 CONTINUE                                                          SMPLW  00213
      IF (.NOT. PRLW) GO TO 400                                         SMPLW  00214
      IF (NBXS .LT. 2) GO TO 400                                        SMPLW  00215
      ISUB = 0                                                          SMPLW  00216
      PHI(ISUB) = 2.*PHI(1) - PHI(2)                                    SMPLW  00217
      PHI(NBXS+1) = 2.*PHI(NBXS) - PHI(NBXS-1)                          SMPLW  00218
      FACTOR = B1BETA/2.0 * BINV**2                                     SMPLW  00219
      DO 350 I = 1,NBXS                                                 SMPLW  00220
      LW(I) = FACTOR*(PHI(I+1) - PHI(I-1))                              SMPLW  00221
  350 CONTINUE                                                          SMPLW  00222
      WRITE (NT6,6012)                                                  SMPLW  00223
      WRITE (NT6,6013) (LW(I),I=1,NBXS)                                 SMPLW  00224
C                                                                       SMPLW  00225
  400 RETURN                                                            SMPLW  00226
C                                                                       SMPLW  00227
  800 WRITE (NT6,8000) IR                                               SMPLW  00228
      GO TO 400                                                         SMPLW  00229
C                                                                       SMPLW  00230
 6001 FORMAT(1H1,20X,8A10/ 51X,18HFLOWFIELD SAMPLING /40X,7H( MACH ,    SMPLW  00231
     1       F5.3,5X,12HRED. FREQ. =,F8.5, 2H )/ 41X,16HSAMPLED AT CHORD SMPLW  00232
     2       I3, 6H, BOX I2, 8H TO BOX I2 / 1HO,2X, 4(10X,4HREAL,8X,    SMPLW  00233
     3       9HIMAGINARY) )                                             SMPLW  00234
 6010 FORMAT(15HO  UP-WASHES - )                                        SMPLW  00235
 6011 FORMAT(15HOSIDE-WASHES - )                                        SMPLW  00236
 6012 FORMAT(22HOLONGITUDINAL-WASHES - )                                SMPLW  00237
 6013 FORMAT(4X,8E16.8)                                                 SMPLW  00238
C                                                                       SMPLW  00239
 8000 FORMAT(54HO*** WARNING - PROBLEMS ENCOUNTERED WHILE GETTING AICS  SMPLW  00240
     1   39H FOR FLOW-FIELD SAMPLING.  ERROR CODE = ,I5, 4H *** )       SMPLW  00241
      END                                                               SMPLW  00242
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      PROGRAM SMTH                                                      FTNX1   00066
C                                                                       SMOOTH  00004
C         THIS PROGRAM WILL FIT A LEAST SQUARES POLYNOMIAL SURFACE      SMOOTH  00005
C         THROUGH THE VELOCITY POTENTIALS FOR A PLANFORM. A NEW SET OF  SMOOTH  00006
C         VELOCITY POTENTIALS WILL BE CALCULATED FROM THE POLYNOMIALS   SMOOTH  00007
C         AND WRITTEN ON THE IVPSC FILE.                                SMOOTH  00008
C                                                                       SMOOTH  00009
      COMMON /ARRAYS/ KBXCDW,LBXCDW,LBOXC,KBXCDT,LBXCDT,KJALPH,LJALPH,  ARRAYS  00002
     1                KALPHA,KKERNL,LKERNL,KPNTRM,LPNTRM,KDEFSL,KELPHI, ARRAYS  00003
     2                LMODES,KPNTSD,LPNTSD,KSDW,LSDW,KPNTDW,LPNTDW,     ARRAYS  00004
     3                KDW,LDW,KTVP,LTVP                                 ARRAYS  00005
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,         FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC          FILES   00003
      COMMON /IOCONT/ OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,      IOCONT  00002
     1                PRPAIC,PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,       IOCONT  00003
     2                PRBL,PRDCP,PRGNAF,PRGNAC,PRSL,PRLW,PRNW,PRCM      BCSFRB  00001
      EQUIVALENCE (PRUW,PRDW)                                           IOCONT  00005
      LOGICAL    OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,PRPAIC,    IOCONT  00006
     1           PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,PRBL,PRSL,PRGNAF,  IOCONT  00007
     2           PRDCP,PRGNAC,PRUW,PRLW,PRNW,PRCM                       BCSFRB  00002
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,    PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                               PROBLM  00003
      LOGICAL         SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                 PROBLM  00004
      COMMON /KVAL  / IKVAL,XKVAL(20), XKS(20)                          KVAL    00002
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,         GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,              GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,         GEOMTY  00004
     3                IXBW,XCENTR                                       GEOMTY  00005
      LOGICAL COPLAN                                                    GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,MXBT,MYBT,MYBBT,MXBST,MYBST,       GEOM2   00002
     1                MYBBST,IXBT,IXBST,CAPL                            GEOM2   00003
      COMMON /TAPEIO/ NFS,NMS,LS,NHR,ID(20),NID,ITYPE,LRS,LWS,M,N,      TAPEIO  00002
     1                PARM(10),IRR                                      TAPEIO  00003
      DIMENSION IPARM(10)                                               TAPEIO  00004
      EQUIVALENCE (PARM,IPARM)                                          TAPEIO  00005
      COMMON /CHECKPR/ DPPCPR,GEOCPR,MODCPR,AICCPR,NWSCPR,SMCPR,GAPCPR  CHECKPR  00002
      LOGICAL  DPPCPR, GEOCPR, MODCPR, AICCPR,NWSCPR,  SMCPR, GAPCPR    CHECKPR  00003
      EQUIVALENCE (CHECKPR,SMCPR )                                      SMOOTH  00020
      LOGICAL CHECKPR                                                   SMOOTH  00021
C                                                                       SMOOTH  00022
C           DELPHI(NBOXES),    TVP(NCOLS1 + NCOLS2 * NSUBDV)          SMOOTH  00023
      COMPLEX   DELPHI(1000),      TVP(250),    AVPS(1250)              SMOOTH  00024
C             X(NO. DELPHI + NO. TVP), Y(SAME)                          SMOOTH  00025
      COMPLEX  SDELPH                                                   SMOOTH  00026
      DIMENSION  X(1250), Y(1250)                                       SMOOTH  00027
C             A(NO. COEFF.)                                             SMOOTH  00028
      COMPLEX    A(66)                                                  SMOOTH  00029
C                                                                       SMOOTH  00030
      COMMON /INDEX/ IS(100),NOC(100),JS(100),JOC(100)                  SMOOTH  00031
C             XP(NO. COEFF. + 1), YP(SAME)                              SMOOTH  00032
      DIMENSION  XP(11), YP(11)                                         SMOOTH  00033
C             FEXLOC((MYBW+MYBT)*NSUBDV),  TEXLOC(SAME)                 SMOOTH  00034
      DIMENSION  FEXLOC(250),                TEXLOC(250)                SMOOTH  00035
C             IPNTRM(2,NROWS*NSUBDV)                                    SMOOTH  00036
      DIMENSION  IPNTRM(2,150)                                          SMOOTH  00037
      DIMENSION  TITL(3)                                                SMOOTH  00038
C                                                                       SMOOTH  00039
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      REAL K1                                                           SMOOTH  00040
      COMPLEX VP                                                        SMOOTH  00041
      LOGICAL  MXREAD,MXWRIT,RANDIN,RANDOU                              SMOOTH  00042
      K1 = XKVAL(IKVAL)                                                 SMOOTH  00043
      MXREAD = .FALSE.                                                  SMOOTH  00044
      RANDIN = .FALSE.                                                  SMOOTH  00045
      MXWRIT = .FALSE.                                                  SMOOTH  00046
      RANDOU = .FALSE.                                                  SMOOTH  00047
      MXB = MXBW                                                        SMOOTH  00048
      IF(COPLAN) MXB = MXBT                                             SMOOTH  00049
C                                                                       SMOOTH  00050
C                                                                       SMOOTH  00051
C         PUT NAME OF SCRATCH FILE FOR SMOOTHED VALUES INTO PLACE       SMOOTH  00052
C                                                                       SMOOTH  00053
      NEVPSC = IAICSC                                                   SMOOTH  00054
      REWIND NEVPSC                                                     SMOOTH  00055
C                                                                       SMOOTH  00056
C         GET THE PLANFORM POINTERS FROM THE MODESC FILE                SMOOTH  00057
C                                                                       SMOOTH  00058
      REWIND MODESC                                                     SMOOTH  00059
      CALL RDINIT                                                       SMOOTH  00060
      ITYPE = 5HMIXED                                                   SMOOTH  00061
      MXARRY = 6HIPNTRM                                                 SMOOTH  00062
      CALL READMX(MODESC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,   SMOOTH  00063
     1            LRS,IPNTRM,2,NPNTRS,PARM,IRR)                         SMOOTH  00064
      IOVLAP = IPARM(3)                                                 SMOOTH  00065
      IF(IRR.NE.0) GO TO 6020                                           SMOOTH  00066
C                                                                       SMOOTH  00067
      CALL RDINIT                                                       SMOOTH  00068
      ITYPE = 5HMIXED                                                   SMOOTH  00069
      NFS = 1                                                           SMOOTH  00070
      MXARRY = 6HIS PT.                                                 SMOOTH  00071
      CALL READMX(MODESC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,   SMOOTH  00072
     1            LRS, IS, M, N, PARM, IRR)                             SMOOTH  00073
      IF(IRR.NE.0) GO TO 6020                                           SMOOTH  00074
C                                                                       SMOOTH  00075
C                                                                       SMOOTH  00076
C         READ THE FEXLOC AND TEXLOC ARRAYS FROM THE GEOMETRY SCRATCH   SMOOTH  00077
C         FILE.  THESE ARE NEEDED TO INTERPOLATE VELOCITY POTENTIALS AT SMOOTH  00078
C         BOX EDGES.                                                    SMOOTH  00079
C                                                                       SMOOTH  00080
      REWIND IGEOSC                                                     SMOOTH  00081
      CALL RDINIT                                                       SMOOTH  00082
      NMS = 2                                                           SMOOTH  00083
      IF(NSURF.EQ.1.OR.COPLAN) NMS=1                                    SMOOTH  00084
      ITYPE = 5HMIXED                                                   SMOOTH  00085
      MXARRY = 6HFEXLOC                                                 SMOOTH  00086
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,   SMOOTH  00087
     1            LRS,FEXLOC,M,N,PARM,IRR)                              SMOOTH  00088
      IF(IRR.NE.0) GO TO 6010                                           SMOOTH  00089
C                                                                       SMOOTH  00090
      CALL RDINIT                                                       SMOOTH  00091
      ITYPE = 5HMIXED                                                   SMOOTH  00092
      MXARRY =6HTEXLOC                                                  SMOOTH  00093
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,   SMOOTH  00094
     1            LRS,TEXLOC,M,N,PARM,IRR)                              SMOOTH  00095
      IF(IRR.NE.0) GO TO 6010                                           SMOOTH  00096
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C                                                                       SMOOTH  00097
C         REORDER THE FEXLOC AND TEXLOC ARRAYS SO THAT THERE ARE        SMOOTH  00098
C         VALUES FOR UNSUBDIVIDED CHORDS ONLY.                          SMOOTH  00099
C                                                                       SMOOTH  00100
      IF(NSUBDV.EQ.1) GO TO 120                                         SMOOTH  00101
      XSLIDE = NSUBDV - IXBW                                            SMOOTH  00102
      JCOL = NSUBCN                                                     SMOOTH  00103
      NCOLS = MYBW + MYBT                                               SMOOTH  00104
      DO 110 I=1,NCOLS                                                  SMOOTH  00105
      TEXLOC(I) = (TEXLOC(JCOL) + XSLIDE)/XSUBDV                        SMOOTH  00106
      FEXLOC(I) = (FEXLOC(JCOL) + XSLIDE)/XSUBDV                        SMOOTH  00107
      JCOL = JCOL + NSUBDV                                              SMOOTH  00108
  110 CONTINUE                                                          SMOOTH  00109
  120 CONTINUE                                                          SMOOTH  00110
C                                                                       SMOOTH  00111
C                                                                       SMOOTH  00112
C         LOOP ON NUMBER OF MODES (ALSO NO. OF V.P.)                    SMOOTH  00113
      REWIND IVPSC                                                      SMOOTH  00114
      DO 2000 NM=1,NMODES                                               SMOOTH  00115
C                                                                       SMOOTH  00116
C         READ DELPHI ARRAY FROM IVPSC. THE TVP ARRAY MUST BE SKIPPED   SMOOTH  00117
C         IF NM IS NOT 1                                                SMOOTH  00118
C                                                                       SMOOTH  00119
      CALL RDINIT                                                       SMOOTH  00120
C                                                                       SMOOTH  00121
C                                                                       SMOOTH  00122
      ITYPE = 5HMIXED                                                   SMOOTH  00123
      CALL READMX(IVPSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,    SMOOTH  00124
     1            LRS,DELPHI,M,N,PARM,IRR)                              SMOOTH  00125
      IF(IRR.NE.0) GO TO 6040                                           SMOOTH  00126
C                                                                       SMOOTH  00127
      CALL RDINIT                                                       SMOOTH  00128
      ITYPE = 5HMIXED                                                   SMOOTH  00129
      CALL READMX(IVPSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,    SMOOTH  00130
     1          LRS,TVP,M,N,PARM,IRR)                                   SMOOTH  00131
      IF(IRR.NE.0) GO TO 6040                                           SMOOTH  00132
C                                                                       SMOOTH  00133
C         LOOP ON NSURF TO FIT EACH PLANFORM INDEPENDENTLY.             SMOOTH  00134
C                                                                       SMOOTH  00135
      DO 1000 NS=1,NSURF                                                SMOOTH  00136
C                                                                       SMOOTH  00137
C         MOVE DELPHI FOR PLANFORM NS TO AVP ARRAY DELETING ZERO        SMOOTH  00138
C         VALUES AND OBTAINING THE (X,Y) COORDINATES IN (I,J) INDICES   SMOOTH  00139
C                                                                       SMOOTH  00140
      IF(NS.EQ.2) GO TO 100                                             SMOOTH  00141
C                                                                       SMOOTH  00142
C         FIRST PLANFORM                                                SMOOTH  00143
      IBEG = 1                                                          SMOOTH  00144
      ILIM = MXBW                                                       SMOOTH  00145
      IC = 0                                                            SMOOTH  00146
      NCH = 0                                                           SMOOTH  00147
      GO TO 200                                                         SMOOTH  00148
C                                                                       SMOOTH  00149
C         SECOND PLANFORM                                               SMOOTH  00150
  100 CONTINUE                                                          SMOOTH  00151
      IFBT = (IXBT-IXBW)/NSUBDV + 1                                     SMOOTH  00152
      IBEG = IFBT                                                       SMOOTH  00153
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      ILIM = MXBT                                                       SMOOTH  00154
      IC   = 0                                                          SMOOTH  00155
      NCH  = MYBW                                                       SMOOTH  00156
      IUP = MXBW                                                        SMOOTH  00157
      IF(COPLAN) IUP = IFBT - 1                                         SMOOTH  00158
      DO 125 I=1,IUP                                                    SMOOTH  00159
      IC = IC + JOC(I)                                                  SMOOTH  00160
  125 CONTINUE                                                          SMOOTH  00161
  200 CONTINUE                                                          SMOOTH  00162
      ICS = IC                                                          SMOOTH  00163
      INO = 0                                                           SMOOTH  00164
      DO 400 IX=IBEG,ILIM                                               SMOOTH  00165
      I = IX                                                            SMOOTH  00166
      IF(NS.EQ.2) I = IX + IOVLAP                                       SMOOTH  00167
      JST = JS(I)                                                       SMOOTH  00168
      JEND = JS(I) + JOC(I)- 1                                          SMOOTH  00169
      DO 400 J=JST,JEND                                                 SMOOTH  00170
      IC = IC + 1                                                       SMOOTH  00171
      IB = IS(J+NCH)                                                    SMOOTH  00172
      IT = IB + NOC(J+NCH) -1                                           SMOOTH  00173
      IF(IX.LT.IB) GO TO 400                                            SMOOTH  00174
      IF(IX.GT.IT) GO TO 400                                            SMOOTH  00175
      INO = INO + 1                                                     SMOOTH  00176
      AVPS(INO) = DELPHI(IC)                                            SMOOTH  00177
      X(INO) = I                                                        SMOOTH  00178
      Y(INO) = J                                                        SMOOTH  00179
  400 CONTINUE                                                          SMOOTH  00180
C                                                                       SMOOTH  00181
C         ADD THE LEADING EDGE VELOCITY POTENTIAL TO THE AVP ARRAY      SMOOTH  00182
C         VEL. POT. = 0. UNLESS IT IS FOR SECOND PLANFORM IN COPLANAR   SMOOTH  00183
C         ANALYSIS                                                      SMOOTH  00184
C                                                                       SMOOTH  00185
      JLAST = MYBW                                                      SMOOTH  00186
      IF(NS.EQ.2) JLAST = MYBT                                          SMOOTH  00187
      DO 600 J=1,JLAST                                                  SMOOTH  00188
      IB = IS(J+NCH)                                                    SMOOTH  00189
      INO= INO +1                                                       SMOOTH  00190
      X(INO) = FEXLOC(J)                                                SMOOTH  00191
      Y(INO) = J                                                        SMOOTH  00192
      AVPS(INO) = (0.,0.)                                               SMOOTH  00193
      IF(NS.EQ.1) GO TO 600                                             SMOOTH  00194
      IF(.NOT.COPLAN) GO TO 600                                         SMOOTH  00195
      XDKVL = (FEXLOC(J+MYBW)-TEXLOC(J)) * K1                           SMOOTH  00196
      JT = J                                                            SMOOTH  00197
      IF(NSUBDV.NE.1) JT = NSUBDV * (J-1) + NSUBCN                      SMOOTH  00198
      AVPS(INO) = TVP(JT) * CMPLX(COS(XDKVL),-SIN(XDKVL))               SMOOTH  00199
  600 CONTINUE                                                          SMOOTH  00200
C                                                                       SMOOTH  00201
C         CALL LEAST SQUARES SURFACE FITTING ROUTINE                    SMOOTH  00202
C                                                                       SMOOTH  00203
      IDIM = 2                                                          SMOOTH  00204
      CN   = 1.0                                                        SMOOTH  00205
      IDEG = NDEG                                                       SMOOTH  00206
      IF(NDEG.NE.0) GO TO 675                                           SMOOTH  00207
      DO 650 I=1,10                                                     SMOOTH  00208
      IDEG = 10 -I+1                                                    SMOOTH  00209
      XM = IDEG + 1                                                     SMOOTH  00210
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      XH2 = XH/2.0                                                    SMOOTH  00211
      NC = XH * XH2 + XH2 + 1.0E-04                                   SMOOTH  00212
      NC = (3*NC) / 2                                                 SMOOTH  00213
      IF(NC.LE.INO) GO TO 675                                         SMOOTH  00214
  650 CONTINUE                                                        SMOOTH  00215
  675 CONTINUE                                                        SMOOTH  00216
      CALL FITTER(IDEG,INO,X,Y,AVPS,A,CN,IDIM)                        SMOOTH  00217
C                                                                     SMOOTH  00218
C         EVALUATE THE POLYNOMIAL EQUATION FOR DELPHI                 SMOOTH  00219
C                                                                     SMOOTH  00220
      MDEG = IDEG + 1                                                 SMOOTH  00221
      IC = ICS                                                        SMOOTH  00222
      DO 900 IX=IBEG,ILIM                                             SMOOTH  00223
      I = IX                                                          SMOOTH  00224
      IF(NS.EQ.2) I= IX +IOVLAP                                       SMOOTH  00225
      XP(1) = 1.                                                      SMOOTH  00226
      DO 700 IP=2,MDEG                                                SMOOTH  00227
  700 XP(IP) =XP(IP-1) * FLOAT(I)                                     SMOOTH  00228
      JI = JS(I)                                                      SMOOTH  00229
      JT = JOC(I) + JI - 1                                            SMOOTH  00230
      DO 900 J=JI,JT                                                  SMOOTH  00231
      IC = IC + 1                                                     SMOOTH  00232
      IB = IS(J+NCH)                                                  SMOOTH  00233
      IT = IB + NOC(J+NCH) - 1                                        SMOOTH  00234
      IF(IX.LT.IB) GO TO 900                                          SMOOTH  00235
      IF(IX.GT.IT) GO TO 900                                          SMOOTH  00236
      YP(1) = 1.0                                                     SMOOTH  00237
      DO 800 JP=2,MDEG                                                SMOOTH  00238
  800 YP(JP) = YP(JP-1) * FLOAT(J)                                    SMOOTH  00239
      VP = A(1)                                                       SMOOTH  00240
      IA = 1                                                          SMOOTH  00241
      DO 850 L2=2,MDEG                                                SMOOTH  00242
      DO 850 L3=1,L2                                                  SMOOTH  00243
      L4 = L2 - L3 + 1                                                SMOOTH  00244
      IA = IA + 1                                                     SMOOTH  00245
      VP = VP + XP(L4)*YP(L3)*A(IA)                                   SMOOTH  00246
  850 CONTINUE                                                        SMOOTH  00247
      DELPHI(IC) = VP                                                 SMOOTH  00248
  900 CONTINUE                                                        SMOOTH  00249
C                                                                     SMOOTH  00250
C         CALCULATE THE TRAILING EDGE VELOCITY POTENTIALS (TVP ARRAY) SMOOTH  00251
C                                                                     SMOOTH  00252
      IF(NS.EQ.2) GO TO 910                                           SMOOTH  00253
      NTST = 1                                                        SMOOTH  00254
      NTVPS = MYBSW                                                   SMOOTH  00255
      JJ = 0                                                          SMOOTH  00256
      GO TO 920                                                       SMOOTH  00257
  910 CONTINUE                                                        SMOOTH  00258
      NTST = NTVPS + 1                                                SMOOTH  00259
      NTVPS = MYBSW + MYBST                                           SMOOTH  00260
  920 CONTINUE                                                        SMOOTH  00261
      DO 930 J=NTST,NTVPS                                             SMOOTH  00262
  930 TVP(J) = (0.,0.)                                                SMOOTH  00263
C                                                                     SMOOTH  00264
      NBEG = NTST + NSUBD2                                            SMOOTH  00265
      NEND = NTVPS -NSUBD2                                            SMOOTH  00266
      JC = 0                                                          SMOOTH  00267
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      DO 960 J=NBEG,NEND,NSUBDV                                          SMOOTH 00268
C         J   = LOCATION IN THE TVP ARRAY (SUBDIVIDED VALUES)             BCSSMA 00001
C         JJ  = LOCATION IN ARRAYS TEXLOC, NOC, IS, ETC.                  BCSSMA 00002
C         JC  = UNSUBDIVIDED CHORD NUMBER                                 BCSSMA 00003
C         IROW = ROW NUMBER OF LAST BOX ON THE CHORD                      BCSSMA 00004
C         I    = ROW LOCATION OF IROW IN ARRAY IPNTRM                     BCSSMA 00005
      JJ = JJ + 1                                                        SMOOTH 00269
      JC = JC + 1                                                        SMOOTH 00270
      I  = TEXLOC(JJ)                                                    SMOOTH 00271
      IROW = I                                                           BCSSMA 00006
      XINCR = TEXLOC(JJ) - I                                             SMOOTH 00273
      IF (.NOT. COPLAN .AND. J .GT. MYBW) I = I + IOVLAP                 SMOOTH 00274
      INDB  = IPNTRM(1,I) + JC - IPNTRM(2,I)                             BCSSMA 00007
C                                                                        SMOOTH 00275
C         TEST FOR 3 BOXES ON CHORD JJ                                   SMOOTH 00276
      IF(NOC(JJ).LT.3) GO TO 940                                         SMOOTH 00277
C                                                                        SMOOTH 00278
C         2 BOXES AND NO MACH RAY AVAILABLE, OR                          BCSSMA 00008
C         3 BOXES OR MORE.  DO LINEAR EXTRAPOLATION.                     SMOOTH 00279
  935 CONTINUE                                                           BCSSMA 00009
      INDE = IPNTRM(1,I-1) + JC - IPNTRM(2,I-1)                          SMOOTH 00280
      SDELPH = DELPHI(INDB) - DELPHI(INDE)                               SMOOTH 00281
      GO TO 950                                                          SMOOTH 00282
C                                                                        SMOOTH 00283
C         TEST FOR MACH RAY EXTRAPOLATION.                               SMOOTH 00284
  940 CONTINUE                                                           SMOOTH 00285
      IB = IS(JJ-1)                                                      SMOOTH 00286
      IX = IB + NOC(JJ-1) + 1                                            SMOOTH 00287
      IF (IROW .LT. IB .OR. IROW .GT. IX) GO TO 945                      BCSSMA 00010
      IB = IS(JJ-2)                                                      SMOOTH 00289
      IX = IB + NOC(JJ-2) + 1                                            SMOOTH 00290
      IM1 = IROW-1                                                       BCSSMA 00011
      IF (IM1 .GE. IB .AND. IM1 .LE. IX) GO TO 948                       BCSSMA 00012
C                                                                        BCSSMA 00013
C         MACH RAY CANNOT BE USED.  TEST FOR 2 BOXES ON CHORD JJ         BCSSMA 00014
  945 CONTINUE                                                           BCSSMA 00015
      IF (NOC(JJ) .LT. 2) GO TO 7010                                     BCSSMA 00016
      GO TO 935                                                          BCSSMA 00017
C                                                                        SMOOTH 00293
C         MACH RAY CAN BE USED                                           SMOOTH 00294
  948 CONTINUE                                                           BCSSMA 00018
      INDA = IPNTRM(1,I-1) + JC - IPNTRM(2,I-1) - 2                      SMOOTH 00295
      INDC = IPNTRM(1,I) + JC - IPNTRM(2,I) -1                           SMOOTH 00296
      SDELPH = 2.0 * DELPHI(INDC) - DELPHI(INDA) - DELPHI(INDB)          SMOOTH 00297
  950 CONTINUE                                                           SMOOTH 00298
      JY = JJ                                                            SMOOTH 00299
      IF(NSUBDV.NE.1) JY = NSUBCN + NSUBDV * (JJ-1)                      SMOOTH 00300
      TVP(JY) = DELPHI(INDB) + XINCR * SDELPH                            SMOOTH 00301
  960 CONTINUE                                                           SMOOTH 00302
C                                                                        SMOOTH 00303
 1000 CONTINUE                                                           SMOOTH 00304
C                                                                        SMOOTH 00305
C         WRITE THE DELPHI AND TVP ARRAY ON THE NIVPSC FILE              SMOOTH 00306
      CALL RDINIT                                                        SMOOTH 00307
      ITYPE = 5HMIXED                                                    SMOOTH 00308
      N = IPNTRM(1,NFNTRS) - 1                                           SMOOTH 00309
      MXARRY = 6HDELPHI                                                  SMOOTH 00310
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      CALL WRTEMX(NIVPSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,2,ID,          SMOOTH  00311
     1            DELPHI,ITYPE,2,N,PARM,IRR)                            SMOOTH  00312
      IF(IRR.NE.0) GO TO 6040                                           SMOOTH  00313
C                                                                       SMOOTH  00314
      N = NTVPS                                                         SMOOTH  00315
      MXARRY = 6HTVP                                                    SMOOTH  00316
      CALL WRTEMX(NIVPSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,2,ID,         SMOOTH  00317
     1            TVP,   ITYPE,2,N,PARM,IRR)                            SMOOTH  00318
      IF(IRR.NE.0) GO TO 6040                                           SMOOTH  00319
C                                                                       SMOOTH  00320
C                                                                       SMOOTH  00321
C         PRINT THE SMOOTHED VEL. POT. ARRAY                            SMOOTH  00322
      IF(.NOT.PRVP) GO TO 1500                                          SMOOTH  00323
      TITL(1) = 8H    WING                                              SMOOTH  00324
      TITL(2) =10HVELOCITY P                                            SMOOTH  00325
      TITL(3) =10HOTENTIALS                                             SMOOTH  00326
      IF(COPLAN) TITL(1) = 10HWING/TAIL                                 SMOOTH  00327
      CALL PRINTR(TITL, NM, DELPHI, 1, 1, MXB, MYBW, IPNTRM)            SMOOTH  00328
      IF(NSURF.EQ.1.OR.COPLAN) GO TO 1500                               SMOOTH  00329
      TITL(1) = 8H    TAIL                                              SMOOTH  00330
      CALL PRINTR(TITL,    NM, DELPHI, 1,  IFBT, MXST, MYBT,            SMOOTH  00331
     1          IPNTRM(1,IOVLAP+1) )                                    SMOOTH  00332
 1500 CONTINUE                                                          SMOOTH  00333
      IF (.NOT. CHECKPR) GO TO 2000                                     SMOOTH  00334
      WRITE (NT6,9400) (TVP(I),I=1,NTVPS)                               SMOOTH  00335
 9400 FORMAT(// (1X,8E16.8) )                                           SMOOTH  00336
C                                                                       SMOOTH  00337
 2000 CONTINUE                                                          SMOOTH  00338
C                                                                       SMOOTH  00339
      END FILE NIVPSC                                                   SMOOTH  00340
      REWIND NIVPSC                                                     SMOOTH  00341
C         CHANGE FILE NAMES                                             SMOOTH  00342
C                                                                       SMOOTH  00343
      IAICSC =  IVPSC                                                   SMOOTH  00344
      IVPSC = NIVPSC                                                    SMOOTH  00345
C                                                                       SMOOTH  00346
      RETURN                                                            SMOOTH  00347
 6010 CONTINUE                                                          SMOOTH  00348
      WRITE (NT6,9010) IGEOSC,IRR                                       SMOOTH  00349
      WRITE (NT6,9011) MXARRY                                           SMOOTH  00350
      GO TO 6100                                                        SMOOTH  00351
 6020 CONTINUE                                                          SMOOTH  00352
      WRITE (NT6,9010) MODESC,IRR                                       SMOOTH  00353
      WRITE (NT6,9011) MXARRY                                           SMOOTH  00354
      GO TO 6100                                                        SMOOTH  00355
 6040 CONTINUE                                                          SMOOTH  00356
      WRITE (NT6,9010) IVPSC,IRR                                        SMOOTH  00357
      WRITE (NT6,9041) NM                                               SMOOTH  00358
 6100 CONTINUE                                                          SMOOTH  00359
      WRITE (NT6,9101) ID(1),ID(2)                                      SMOOTH  00360
      WRITE (NT6,9102) PARM,IPARM                                       SMOOTH  00361
      WRITE (NT6,9103) NFS,NMS                                          SMOOTH  00362
      WRITE (NT6,9104) ITYPE,M,N                                        SMOOTH  00363
      WRITE (NT6,9900)                                                  SMOOTH  00364
      GO TO 8000                                                        SMOOTH  00365
C                                                                       SMOOTH  00366
 7010 CONTINUE                                                          SMOOTH  00367
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      WRITE (NT6,8020)                                                  SMOOTH  00368
      WRITE (NT6,8021) IROW,JC                                          BCSSMA  00019
C                                                                       SMOOTH  00370
 8000 CONTINUE                                                          SMOOTH  00371
      CALL FLUSH(1)                                                     SMOOTH  00372
C                                                                       SMOOTH  00373
 9020 FORMAT(73H0*** ERROR - NO TIP TRAILING EDGE VELOCITY POTENTIAL CAN SMOOTH  00374
     1 BE COMPUTED. *** )                                               SMOOTH  00375
 8021 FORMAT(5X,13HCOORDINATES (I2,1H,I2,1H) )                          SMOOTH  00376
 9010 FORMAT(53H0*** ERROR - WHILE READING THE GEOMETRY SCRATCH FILE A10 SMOOTH  00377
     1, 15H, ERROR CODE = I4,4H *** )                                   SMOOTH  00378
 9011 FORMAT(5X,32HAN ATTEMPT WAS MADE TO READ THE A6, 8H MATRIX.//)    SMOOTH  00379
 9041 FORMAT(5X,54HAN ATTEMPT WAS MADE TO READ THE VEL. POT. ARRAY NUMBE SMOOTH  00380
     1R I3,1H. )                                                        SMOOTH  00381
 9090 FORMAT(56H0*** ERROR - WHILE WRITING ON THE VEL. POT. SCRATCH FILE SMOOTH  00382
     1       A10, 15H, ERROR CODE = I4,4H *** )                         SMOOTH  00383
 9051 FORMAT(5X,36HATTEMPTING TO WRITE VEL. POT. NUMBER I3 )            SMOOTH  00384
 9101 FORMAT(5X,*MATRIX ID = *, A10, I10)                               SMOOTH  00385
 9102 FORMAT(5X,*PARAMETERS *,10E11.3, / 10X,*(INTEGER)*, I7, 9I11 )    SMOOTH  00386
 9103 FORMAT(5X,*FILE SPACING = *,I3,* MATRIX SPACING = *,I3 )          SMOOTH  00387
 9104 FORMAT(5X,*MATRIX TYPE =*,A10,*, DIMENSIONED (*I4,2H X,I4,1H) )   SMOOTH  00388
 9900 FORMAT(*0     ERROR OCCURRED IN SMOOTHING SECTION. *)             FTN01   00068
      END                                                               SMOOTH  00390
```

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      SUBROUTINE PRINTR( TITL,IMODE,ARRAY,K,IXB,MXB,MYB,IPNTRM)          PRNTVP  00002
C                                                                        PRNTVP  00003
C        TITL   - TITLE TO PRINT FOR THE ARRAY                           PRNTVP  00004
C        IMODE  - MODE SHAPE NUMBER                                      PRNTVP  00005
C        ARRAY  - ARRAY TO BE PRINTED                                    PRNTVP  00006
C                                                                        PRNTVP  00007
      DIMENSION ARRAY(K,1), TITL(3)                                      PRNTVP  00008
      COMPLEX ARRAY                                                      PRNTVP  00009
      DIMENSION IPNTRM(2,100)                                            PRNTVP  00010
      COMMON /CONTRL/ PREVEX,CMACH, TITLE(8), PRVGEOM,PRVMODE,DIHW,DIHT, CONTRL  00002
     1               DEFAULT                                             CONTRL  00003
      LOGICAL     PRVGEOM,PRVMODE,DIHW,DIHT,DEFAULT                      CONTRL  00004
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,     PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                                PROBLM  00003
      LOGICAL          SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                 PROBLM  00004
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,          FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC           FILES   00003
      COMMON /KVAL  / IKVAL,XKVAL(20), XKS(20)                           KVAL    00002
      DIMENSION PC(2)                                                    PRNTVP  00016
      DIMENSION S(50),D(50)                                              PRNTVP  00020
      EQUIVALENCE (S(1),BUFF(1)),(D(1),BUFF(1251))                       PRNTVP  00021
      REAL K1                                                            PRNTVP  00022
      INTEGER PAGE                                                       PRNTVP  00023
      COMMON /RWBUFF/ BFCODE,IBFCNT,  BUFF(3280)                         RWBUFF  00002
      DATA   PC    / 1OHPAGE CONTI,4HNUED /                              FTNX1   00070
      DATA   BLANK / 1H  /                                               FTNX1   00071
      DATA   XINIT / -1.0 /                                              FTNX1   00072
      K1 = XKVAL(IKVAL)                                                  PRNTVP  00024
      IF (XKS(IKVAL) .NE. XINIT) K1 = XKS(IKVAL)                         PRNTVP  00025
C                                                                        PRNTVP  00026
C                                                                        PRNTVP  00027
      PAGE = 0                                                           PRNTVP  00028
      N =1                                                               PRNTVP  00029
      M =4                                                               PRNTVP  00030
      IF(M.GT.MYB) M = MYB                                               PRNTVP  00031
  100 LINE = 100                                                         PRNTVP  00032
  200 DO 1400 I = IXB,MXB                                                PRNTVP  00033
      DO 300 J=N,M                                                       PRNTVP  00034
      S(J) = 0.0                                                         PRNTVP  00035
      D(J) = 0.0                                                         PRNTVP  00036
  300 CONTINUE                                                           PRNTVP  00037
      IF(LINE.LE.50) GO TO 900                                           PRNTVP  00038
      PAGE = PAGE + 1                                                    PRNTVP  00039
      LINE = 4                                                           PRNTVP  00040
      WRITE (NT6,9001) TITLE,TITL, XMACH, K1, IMODE                      PRNTVP  00041
C                                                                        PRNTVP  00042
      IF(PAGE.EQ.1) GO TO 700                                            PRNTVP  00043
      WRITE (NT6,9005) PC                                                PRNTVP  00044
      GO TO 800                                                          PRNTVP  00045
  700 WRITE(NT6,9005)                                                    PRNTVP  00046
  800 CONTINUE                                                           PRNTVP  00047
      WRITE(NT6,6006) (BLANK,J,J=N,M)                                    PRNTVP  00048
      WRITE(NT6,6007) (BLANK,  J=N,M)                                    PRNTVP  00049
  900 CONTINUE                                                           PRNTVP  00050
      JS = IPNTRM(2,I)                                                   PRNTVP  00051
      IDX = IPNTRM(1,I)                                                  PRNTVP  00052
      JE =IPNTRM(1,I+1) - IDX + JS -1                                    PRNTVP  00053
```

```
      IF(JE.EQ.0) GO TO 1400                                          PRNTVP  00054
      DO 1000 J=JS,JE                                                 PRNTVP  00055
      S(J) =  REAL(ARRAY(1,IDX) )                                     PRNTVP  00056
      D(J) = AIMAG(ARRAY(1,IDX) )                                     PRNTVP  00057
      IDX = IDX +1                                                    PRNTVP  00058
 1000 CONTINUE                                                        PRNTVP  00059
      DO 1200 J=N,M                                                   PRNTVP  00060
      IF(S(J)) 1300,1100,1300                                         PRNTVP  00061
 1100 CONTINUE                                                        PRNTVP  00062
      IF(D(J)) 1300,1200,1300                                         PRNTVP  00063
 1200 CONTINUE                                                        PRNTVP  00064
      GO TO 1400                                                      PRNTVP  00065
 1300 WRITE (NT6,9013) I,(S(J),D(J),J=N,M)                            PRNTVP  00066
      LINE = LINE + 1                                                 PRNTVP  00067
 1400 CONTINUE                                                        PRNTVP  00068
      M = M+4                                                         PRNTVP  00069
      N = N+4                                                         PRNTVP  00070
      IF(N.GT.MYB ) GO TO 1500                                        PRNTVP  00071
      IF(M.GT.MYB ) M=MYB                                             PRNTVP  00072
      IF(LINE.GT.45) GO TO 100                                        PRNTVP  00073
      WRITE(NT6,6006) (BLANK,J,J=N,M)                                 PRNTVP  00074
      WRITE(NT6,6007) (BLANK,  J=N,M)                                 PRNTVP  00075
      LINE = LINE+3                                                   PRNTVP  00076
      GO TO 200                                                       PRNTVP  00077
 1500 CONTINUE                                                        PRNTVP  00078
      RETURN                                                          PRNTVP  00079
 9001 FORMAT(1H1,20X,8A10/ 46X,*SMOOTHED *,3A10/ 46X,7H( MACH F5.3,5X,PRNTVP  00080
     1   12HRED. FREQ. =,F8.5, * )* / 52X,*MODE   SHAPE*, I3)         PRNTVP  00081
 9005 FORMAT(44X,42(1H-),20X,A10,A4)                                  PRNTVP  00082
 6006 FORMAT(4HGRCW, A1,14X,9HCHORD,I3, 3(A1,22X,9HCHORD,I3) )        PRNTVP  00083
 6007 FORMAT(3X, 4(A1,9X,4HREAL,8X,9HIMAGINARY) )                     PRNTVP  00084
 9013 FORMAT(I4,8E16.8)                                               PRNTVP  00085
      END                                                             PRNTVP  00086
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      SUBROUTINE FITTER(M,N,X,Y,Z,C,CN,IDIM)                            FITTER  00002
      DIMENSION X(100), Y(100), Z(IDIM,100), C(IDIM,66)                 FITTER  00003
      DIMENSION AI(68),A(66,68),XP(11),YP(11)                           FITTER  00004
      DIMENSION  VS(10)                                                 FITTER  00005
      LOGICAL COMPLX                                                    FITTER  00006
C                                                                       FITTER  00007
C        M  - DEGREE OF POLYNOMIAL EQUATION                             FITTER  00008
C        N  - NUMBER OF DATA POINTS TO FIT CURVE THROUGH                FITTER  00009
C        X  - X COORDINATE OF DATA POINT                                FITTER  00010
C        Y  - Y COORDINATE OF DATA POINT                                FITTER  00011
C        Z  - Z COORDINATE OF DATA POINT                                FITTER  00012
C        C  - OUTPUT COEFFICIENT ARRAY                                  FITTER  00013
C       CN - SCALE FACTOR                                               FITTER  00014
C        CN - SCALE FACTOR                                              FITTER  00015
C        IDIM - INDICATOR OF REAL OR COMPLEX FUNCTION                   FITTER  00016
C             = 1, FUNCTION IS REAL                                     FITTER  00017
C             = 2, FUNCTION IS COMPLEX                                  FITTER  00018
C              IF COMPLEX SET DIMENSIONS OF FUNCTION AND COEFFICIENTS    FITTER  00019
C              TO  (IDIM * --- )                                        FITTER  00020
C                                                                       FITTER  00021
C        DETERMINE NUMBER OF COEFFIENTS                                 FITTER  00022
C                                                                       FITTER  00023
      EPS = 1.0E-04                                                     FITTER  00024
      COMPLX = .FALSE.                                                  FITTER  00025
      IF(IDIM.EQ.2) COMPLX = .TRUE.                                     FITTER  00026
C                                                                       FITTER  00027
C        SCALE DATA TO REDUCE MAGNITUDE OF MATRIX TERMS.                FITTER  00028
C        SHOULD AVOID BOMB OUTS DUE TO OVERFLOW CONDITIONS.             FITTER  00029
      IF(CN.EQ.0) CN=1.0                                                FITTER  00030
      IF(CN.EQ.1.0) GO TO 15                                            FITTER  00031
      DO 5 I=1,N                                                        FITTER  00032
      X(I) = X(I)/CN                                                    FITTER  00033
      Y(I) = Y(I)/CN                                                    FITTER  00034
    5 CONTINUE                                                          FITTER  00035
   15 CONTINUE                                                          FITTER  00036
      XM = M + 1                                                        FITTER  00037
      XM2= XM/2.                                                        FITTER  00038
      NC = XM*XM2 + XM2 + EPS                                           FITTER  00039
      IF(NC.LE.N) GO TO 25                                              FITTER  00040
      M = M-1                                                           FITTER  00041
      GO TO 15                                                          FITTER  00042
   25 CONTINUE                                                          FITTER  00043
C                                                                       FITTER  00044
      NAC = NC                                                          FITTER  00045
C                                                                       FITTER  00046
C        DETERMINE THE MAXIMUM DEGREE THAT CAN BE COMPUTED IN           FITTER  00047
C        EACH DIRECTION AND SET UP ORDER OF SOLUTION.                   FITTER  00048
C                                                                       FITTER  00049
      NDV = 1                                                           FITTER  00050
      MDX = M                                                           FITTER  00051
      VS(1) = X(1)                                                      FITTER  00052
      DO 60 I=1,N                                                       FITTER  00053
      DO 40 J=1,NDV                                                     FITTER  00054
      IF(X(I).EQ.VS(J)) GO TO 55                                        FITTER  00055
   50 CONTINUE                                                          FITTER  00056
      NDV = NDV + 1                                                     FITTER  00057
      VS(NDV) = X(I)                                                    FITTER  00058
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      IF(NDV-1.EQ.M) GO TO 65                                          FITTER  00059
   55 CONTINUE                                                         FITTER  00060
   60 CONTINUE                                                         FITTER  00061
      MDX = NDV -1                                                     FITTER  00062
   65 CONTINUE                                                         FITTER  00063
C                                                                      FITTER  00064
      NDV = 1                                                          FITTER  00065
      MDY = M                                                          FITTER  00066
      VS(1) = Y(1)                                                     FITTER  00067
      DO 80 I=1,N                                                      FITTER  00068
      DO 70 J=1,NDV                                                    FITTER  00069
      IF(Y(I).EQ.VS(J)) GO TO 75                                       FITTER  00070
   70 CONTINUE                                                         FITTER  00071
      NDV = NDV + 1                                                    FITTER  00072
      VS(NDV) = Y(I)                                                   FITTER  00073
      IF(NDV-1.EQ.M) GO TO 85                                          FITTER  00074
   75 CONTINUE                                                         FITTER  00075
   80 CONTINUE                                                         FITTER  00076
      MDY = NDV - 1                                                    FITTER  00077
   85 CONTINUE                                                         FITTER  00078
C                                                                      FITTER  00079
      ITOT =NC +1                                                      FITTER  00080
      ITOT1 = ITOT                                                     FITTER  00081
      IF(COMPLX) ITOT = ITOT + 1                                       FITTER  00082
C                                                                      FITTER  00083
C         ZERO OUT THE A ARRAY                                         FITTER  00084
C                                                                      FITTER  00085
      DO 95 I=1,NC                                                     FITTER  00086
      B(  ,I) = 0.0                                                    FITTER  00087
      IF(.NOT.COMPLX) GO TO 90                                         FITTER  00088
      B(2,I) = 0.0                                                     FITTER  00089
   90 CONTINUE                                                         FITTER  00090
      DO 95 J=1,ITOT                                                   FITTER  00091
   95 A(I,J) = 0.0                                                     FITTER  00092
C                                                                      FITTER  00093
C         DETERMINE DEVIATION EQUATION AND SQUARE THE EQUATION         FITTER  00094
C                                                                      FITTER  00095
      AI(1) =1.0                                                       FITTER  00096
      XP(1) =1.0                                                       FITTER  00097
      YP(1) =1.0                                                       FITTER  00098
      MM = M + 1                                                       FITTER  00099
      DO 200 K=1,N                                                     FITTER  00100
      DO 10 L=2,MM                                                     FITTER  00101
      XP(L) = XP(L-1)*X(K)                                             FITTER  00102
      YP(L) = YP(L-1)*Y(K)                                             FITTER  00103
   10 CONTINUE                                                         FITTER  00104
C                                                                      FITTER  00105
      I = 1                                                            FITTER  00106
      DO 40 L=2,MM                                                     FITTER  00107
      DO 20 LL=1,L                                                     FITTER  00108
      IL= L - LL +1                                                    FITTER  00109
      IF(LL-1.GT.MDY) GO TO 30                                         FITTER  00110
      IF(IL-1.GT.MDX) GO TO 20                                         FITTER  00111
      I = I + 1                                                        FITTER  00112
      AI(I) = XP(IL)*YP(LL)                                            FITTER  00113
   20 CONTINUE                                                         FITTER  00114
   30 CONTINUE                                                         FITTER  00115
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   40 CONTINUE                                                    FITTER  00116
      AI(I+1) = Z(1,K)                                            FITTER  00117
      IF(COMPLX) AI(I+2) = Z(2,K)                                 FITTER  00118
      IF(K.GT.1) GO TO 45                                         FITTER  00119
      NC = I                                                      FITTER  00120
      ITOT = NC + 1                                               FITTER  00121
      ITOT1 = ITOT                                                FITTER  00122
      IF(COMPLX) ITOT = ITOT + 1                                  FITTER  00123
   45 CONTINUE                                                    FITTER  00124
C                                                                 FITTER  00125
      DO 1100 I=1,NC                                              FITTER  00126
      DO 1100 J=I,ITOT                                            FITTER  00127
      ASAV = AI(I)*AI(J)                                          FITTER  00128
      A(I,J)=A(I,J)+ASAV                                          FITTER  00129
 1100 CONTINUE                                                    FITTER  00130
  200 CONTINUE                                                    FITTER  00131
C                                                                 FITTER  00132
C         SQUARE ROOT METHOD                                      FITTER  00133
C         INTERMEDIATE MATRIX                                     FITTER  00134
      DO 1200 I=1,NC                                              FITTER  00135
      IM1 = I-1                                                   FITTER  00136
      TMP=0.0                                                     FITTER  00137
      IF(I.EQ.1) GO TO 1150                                       FITTER  00138
      DO 1120 L=1,IM1                                             FITTER  00139
 1120 TMP= TMP+ A(L,I)**2                                         FITTER  00140
 1150 CONTINUE                                                    FITTER  00141
      T = A(I,I) - TMP                                            FITTER  00142
      IF(T.GT.EPS) GO TO 4                                        FITTER  00143
      A(I,I) = 0.0                                                FITTER  00144
      GO TO 1200                                                  FITTER  00145
    4 CONTINUE                                                    FITTER  00146
      A(I,I) = SQRT(T)                                            FITTER  00147
      IF(A(I,I).GT.EPS) GO TO 1155                                FITTER  00148
      A(I,ITOT) = 0.0                                             FITTER  00149
      GO TO 1200                                                  FITTER  00150
 1155 CONTINUE                                                    FITTER  00151
C                                                                 FITTER  00152
      JS = I+1                                                    FITTER  00153
      DO 1180 J = JS,ITOT                                         FITTER  00154
      TMP= 0.0                                                    FITTER  00155
      IF(I.EQ.1) GO TO 1175                                       FITTER  00156
      DO 1160 L=1,IM1                                             FITTER  00157
 1160 TMP = TMP + A(L,I)*A(L,J)                                   FITTER  00158
 1175 A(I,J) =(A(I,J)-TMP)/A(I,I)                                 FITTER  00159
 1180 CONTINUE                                                    FITTER  00160
 1200 CONTINUE                                                    FITTER  00161
C                                                                 FITTER  00162
C                                                                 FITTER  00163
C         BACK SUBSTITUTE FOR COEFFICIENTS                        FITTER  00164
      DO 1400 K=1,NC                                              FITTER  00165
      I = NC - K + 1                                              FITTER  00166
      IP1=I+1                                                     FITTER  00167
      TMP1  = 0.0                                                 FITTER  00168
      TMP2  = 0.0                                                 FITTER  00169
      IF(A(I,I).GT.EPS) GO TO 1325                                FITTER  00170
      C(1,I) = 0.0                                                FITTER  00171
      IF(COMPLX) C(2,I) = 0.0                                     FITTER  00172
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      GO TO 1400                                                        FITTER  00173
 1325 CONTINUE                                                          FITTER  00174
      IF(I.EQ.NC)GO TO 1375                                             FITTER  00175
      DO 1350 L=IP1,NC                                                  FITTER  00176
      TMP1  = TMP1 + A(I,L)*C(1,L)                                      FITTER  00177
      IF(.NOT.COMPLX) GO TO 1350                                        FITTER  00178
      TMP2  = TMP2 + A(I,L)*C(2,L)                                      FITTER  00179
 1350 CONTINUE                                                          FITTER  00180
 1375 CONTINUE                                                          FITTER  00181
      C(1,I) =(A(I,ITOT1)-TMP1)/A(I,I)                                  FITTER  00182
      IF(.NOT.COMPLX) GO TO 1400                                        FITTER  00183
      C(2,I) =(A(I,ITOT) -TMP2)/A(I,I)                                  FITTER  00184
 1400 CONTINUE                                                          FITTER  00185
C                                                                       FITTER  00186
C                                                                       FITTER  00187
C         REORDER THE COEFFICIENTS IN CORRECT POWERS                    FITTER  00188
C         OF X AND Y.                                                   FITTER  00189
C                                                                       FITTER  00190
      IF(NAC.EQ.NC) GO TO 1475                                          FITTER  00191
C                                                                       FITTER  00192
      IZ = 1                                                            FITTER  00193
      I  = 1                                                            FITTER  00194
      DO 1440 L=2,MM                                                    FITTER  00195
      DO 1420 LL=1,L                                                    FITTER  00196
      IL = L -LL +1                                                     FITTER  00197
      I = I +1                                                          FITTER  00198
      IF(LL-1.LE.MDY.AND.IL-1.LE.MDX) GO TO 1410                        FITTER  00199
      X(I) = 0.0                                                        FITTER  00200
      Y(I) = 0.0                                                        FITTER  00201
      GO TO 1420                                                        FITTER  00202
 1410 CONTINUE                                                          FITTER  00203
      IZ = IZ + 1                                                       FITTER  00204
      X(I) = C(1,IZ)                                                    FITTER  00205
      IF(COMPLX) Y(I) = C(2,IZ)                                         FITTER  00206
 1420 CONTINUE                                                          FITTER  00207
 1440 CONTINUE                                                          FITTER  00208
C                                                                       FITTER  00209
      DO 1450 I=2,NAC                                                   FITTER  00210
      C(1,I) = X(I)                                                     FITTER  00211
      IF(COMPLX) C(2,I) = Y(I)                                          FITTER  00212
 1450 CONTINUE                                                          FITTER  00213
 1475 CONTINUE                                                          FITTER  00214
C                                                                       FITTER  00215
C         ELIMINATE THE SCALE FACTOR FROM THE COEFFICIENTS.             FITTER  00216
C                                                                       FITTER  00217
      IF(CN.EQ.1.0) GO TO 1700                                          FITTER  00218
      I=1                                                               FITTER  00219
      CP= 1.0/CN                                                        FITTER  00220
      DO 1600 L1=2,MM                                                   FITTER  00221
      DO 1500 L2=1,L1                                                   FITTER  00222
      I = I+1                                                           FITTER  00223
      C(1,I) = C(1,I)*CP                                                FITTER  00224
      C(2,I) = C(2,I)*CP                                                FITTER  00225
 1500 CONTINUE                                                          FITTER  00226
      CP= CP/CN                                                         FITTER  00227
 1600 CONTINUE                                                          FITTER  00228
 1700 CONTINUE                                                          FITTER  00229
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C                                                          FITTER  00230
C       THE C ARRAY NOW CONTAINS THE COEFFICIENTS.         FITTER  00231
C                                                          FITTER  00232
      RETURN                                               FITTER  00233
      END                                                  FITTER  00234
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      OVERLAY(WFMBOX,1,7)                                                    CHORDF  00002
      PROGRAM CHORDF                                                         CHORDF  00003
C                                                                            CHORDF  00004
C         THIS PROGRAM WILL FIT A CURVE THROUGH THE VELOCITY POTENTIALS      CHORDF  00005
C         ALONG EACH CHORD INDEPENDENTLY. THESE CURVES WILL BE USED TO       CHORDF  00006
C         EVALUATE A SMOOTHED VELOCITY POTENTIAL.                            CHORDF  00007
C                                                                            CHORDF  00008
      COMMON /ARRAYS/ KBXCDW,LBXCDW,LBOXC,KBXCDT,LBXCDT,KJALPH,LJALPH,       ARRAYS  00002
     1                KALPHA,KKERNL,LXERNL,KPNTRM,LPNTRM,KDEFSL,KELPHI,      ARRAYS  00003
     2                LMODES,KPNTSD,LPNTSD,KSDW,LSDW,KPNTDW,LPNTDW,          ARRAYS  00004
     3                KDW,LDW,KTVP,LTVP                                      ARRAYS  00005
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,              FILES   00002
     1                ICUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC               FILES   00003
      COMMON /ICCONT/ OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,           ICCONT  00002
     1                PRPAIC,PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,            ICCONT  00003
     2                PRBL,PRDCP,PRGNAF,PRGNAC,PRSL,PRLW,PRNW,PRCM           BCSFRB  00001
      EQUIVALENCE (PRUW,PRDW)                                                ICCONT  00005
      LOGICAL   OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,PRPAIC,          ICCONT  00006
     1          PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,PRBL,PRSL,PRGNAF,        ICCONT  00007
     2          PRDCP,PRGNAC,PRUW,PRLW,PRNW,PRCM                             BCSFRB  00002
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,         PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                                    PROBLM  00003
      LOGICAL         SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                      PROBLM  00004
      COMMON /KVAL  / IKVAL,XKVAL(20), XKS(20)                               KVAL    00002
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,              GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,                   GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,              GEOMTY  00004
     3                IXBW,XCENTR                                            GEOMTY  00005
      LOGICAL COPLAN                                                         GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,MXBT,MYBT,MYBBT,MXBST,MYBST,           GEOM2   00002
     1                MYBBST,IXBT,IXBST,CAPL                                 GEOM2   00003
      COMMON /TAPEIO/ NFS,NMS,LS,NMR,ID(20),NID,ITYPE,LRS,LWS,M,N,           TAPEIO  00002
     1                PARM(10),IRR                                           TAPEIO  00003
      DIMENSION IPARM(10)                                                    TAPEIO  00004
      EQUIVALENCE (PARM,IPARM)                                               TAPEIO  00005
      COMMON /CHECKPR/ DPPCPR,GEOCPR,MODCPR,AICCPR,NWSCPR,SMCPR,GAFCPR       CHECKPR 00002
      LOGICAL  DPPCPR, GEOCPR, MODCPR, AICCPR,NWSCPR,  SMCPR, GAFCPR         CHECKPR 00003
      EQUIVALENCE (CHECKPR,SMCPR)                                            CHORDF  00019
      LOGICAL CHECKPR                                                        FTN001  00073
C                                                                            CHORDF  00020
C           DELPHI(NBOXES),     TVP(NCOLS1 + NCOLS2 * NSUBDV)              CHORDF  00021
      COMPLEX   DELPHI(1000),       TVP(250),    AVPS(52)                    CHORDF  00022
C            X(NO. DELPHI + NO. TVP), Y(SAME)                                CHORDF  00023
      DIMENSION  X(52),   Y(52)                                              CHORDF  00024
C            A(NO. COEFF.)                                                   CHORDF  00025
      COMPLEX    A(21)                                                       CHORDF  00026
C                                                                            CHORDF  00027
      COMMON /INDEX/ IS(100),NOC(100),JS(100),JOC(100)                       CHORDF  00028
C            FEXLOC((MYBW+MYBT)*NSUBDV),  TEXLOC(SAME)                       CHORDF  00029
      DIMENSION  FEXLOC(250),                TEXLOC(250)                     CHORDF  00030
C            IPNTRM(2,NROWS*NSUBDV)                                          CHORDF  00031
      DIMENSION  IPNTRM(2,150)                                               CHORDF  00032
      DIMENSION  TITL(3)                                                     CHORDF  00033
C                                                                            CHORDF  00034
      REAL K1                                                                CHORDF  00035
      COMPLEX   VP, SDELPH, VC, AVPA, AVPB                                   CHORDF  00036
      LOGICAL  MXREAD,MXWRIT,RANDIN,RANDOU                                   CHORDF  00037
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      K1 = %%VAL(IKVAL)                                                 CHORDF  00038
      MXREAD = .FALSE.                                                  CHORDF  00039
      RANDIN = .FALSE.                                                  CHORDF  00040
      MXWRIT = .FALSE.                                                  CHORDF  00041
      RANDOU = .FALSE.                                                  CHORDF  00042
      MXB = MXBW                                                        CHORDF  00043
      IF(COPLAN) MXB = MXBT                                             CHORDF  00044
C                                                                       CHORDF  00045
C                                                                       CHORDF  00046
C         PUT NAME OF SCRATCH FILE FOR SMOOTHED VALUES INTO PLACE       CHORDF  00047
C                                                                       CHORDF  00048
      NIVPSC = IAICSC                                                   CHORDF  00049
      REWIND NIVPSC                                                     CHORDF  00050
C                                                                       CHORDF  00051
C         GET THE PLANFORM POINTERS FROM THE MODESC FILE                CHORDF  00052
C                                                                       CHORDF  00053
      REWIND MODESC                                                     CHORDF  00054
      CALL RDINIT                                                       CHORDF  00055
      ITYPE = 5HMIXED                                                   CHORDF  00056
      MXARRY = 6HIPNTRM                                                 CHORDF  00057
      CALL READMX(MODESC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,   CHORDF  00058
     1            LRS,IPNTRM,2,NPNTRS,PARM,IRR)                         CHORDF  00059
      IOVLAP = IPARM(3)                                                 CHORDF  00060
      IF(IRR.NE.0) GO TO 6020                                           CHORDF  00061
C                                                                       CHORDF  00062
      CALL RDINIT                                                       CHORDF  00063
      ITYPE = 5HMIXED                                                   CHORDF  00064
      NFS = 1                                                           CHORDF  00065
      MXARRY =6HIS PT.                                                  CHORDF  00066
      CALL READMX(MODESC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,   CHORDF  00067
     1            LRS, IS, M, N, PARM, IRR)                             CHORDF  00068
      IF(IRR.NE.0) GO TO 6020                                           CHORDF  00069
C                                                                       CHORDF  00070
C                                                                       CHORDF  00071
C         READ THE FEXLOC AND TEXLOC ARRAYS FROM THE GEOMETRY SCRATCH   CHORDF  00072
C         FILE.  THESE ARE NEEDED TO INTERPOLATE VELOCITY POTENTIALS AT CHORDF  00073
C         BOX EDGES.                                                    CHORDF  00074
C                                                                       CHORDF  00075
      REWIND IGEOSC                                                     CHORDF  00076
      CALL RDINIT                                                       CHORDF  00077
      NMS = 2                                                           CHORDF  00078
      IF(NSURF.EQ.1.OR.COPLAN) NMS=1                                    CHORDF  00079
      ITYPE = 5HMIXED                                                   CHORDF  00080
      MXARRY = 6HFEXLOC                                                 CHORDF  00081
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,   CHORDF  00082
     1            LRS,FEXLOC,M,N,PARM,IRR)                              CHORDF  00083
      IF(IRR.NE.0) GO TO 6010                                           CHORDF  00084
C                                                                       CHORDF  00085
      CALL RDINIT                                                       CHORDF  00086
      ITYPE = 5HMIXED                                                   CHORDF  00087
      MXARRY =6HTEXLOC                                                  CHORDF  00088
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,   CHORDF  00089
     1            LRS,TEXLOC,M,N,PARM,IRR)                              CHORDF  00090
      IF(IRR.NE.0) GO TO 6010                                           CHORDF  00091
C                                                                       CHORDF  00092
C         REORDER THE FEXLOC AND TEXLOC ARRAYS SO THAT THERE ARE        CHORDF  00093
C         VALUES FOR UNSUBDIVIDED CHORDS ONLY.                          CHORDF  0009*
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C                                                                       CHORDF  00095
      IF(NSUBDV.EQ.1) GO TO 120                                         CHORDF  00096
      XSLIDE = NSUBDV - IXBW                                            CHORDF  00097
      JCOL = NSUBCN                                                     CHORDF  00098
      NCOLS =  MYBW + MYBT                                              CHORDF  00099
      DO 110 I=1,NCOLS                                                  CHORDF  00100
      TEXLOC(I) = (TEXLOC(JCOL) + XSLIDE)/XSUBDV                        CHORDF  00101
      FEXLOC(I) = (FEXLOC(JCOL) + XSLIDE)/XSUBDV                        CHORDF  00102
      JCOL = JCOL + NSUBDV                                              CHORDF  00103
  110 CONTINUE                                                          CHORDF  00104
  120 CONTINUE                                                          CHORDF  00105
C                                                                       CHORDF  00106
      IFBT = (IXBT-IXBW)/NSUBDV + 1                                     CHORDF  00107
C                                                                       CHORDF  00108
C         LOOP ON NUMBER OF MODES (ALSO NO. OF V.P.)                    CHORDF  00109
      REWIND IVPSC                                                      CHORDF  00110
      DO 2000 NM=1,NMODES                                               CHORDF  00111
C                                                                       CHORDF  00112
C         READ DELPHI ARRAY FROM IVPSC. THE TVP ARRAY MUST BE SKIPPED   CHORDF  00113
C         IF NM IS NOT 1                                                CHORDF  00114
C                                                                       CHORDF  00115
      CALL RDINIT                                                       CHORDF  00116
      ITYPE = SHMIXED                                                   CHORDF  00117
      NMS = 1                                                           CHORDF  00118
      IF(NM.EQ.1) NMS = 0                                               CHORDF  00119
      CALL READMX(IVPSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,    CHORDF  00120
     1            LRS,DELPHI,M,N,PARM,IRR)                              CHORDF  00121
      IF(IRR.NE.0) GO TO 6040                                           CHORDF  00122
C                                                                       CHORDF  00123
C         LOOP ON NUMBER OF CHORDS                                      CHORDF  00124
C                                                                       CHORDF  00125
      NCHRDS = MYBW                                                     CHORDF  00126
      IF(NSURF.EQ.2) NCHRDS = MYBW + MYBT                               CHORDF  00127
      DO 1000  J=1,NCHRDS                                               CHORDF  00128
      NC = 1                                                            CHORDF  00129
      IF(J.GT.MYBW) NC = MYBW + 1                                       CHORDF  00130
      IST = IS(J)                                                       CHORDF  00131
      NK  = IST + NOC(J) - 1                                            CHORDF  00132
      JSUM= 0                                                           CHORDF  00133
      ITROW = IST                                                       CHORDF  00134
      IF(.NOT.COPLAN.AND.J.GT.MYBW) ITROW = IST + IOVLAP                CHORDF  00135
      DO 100 I=1,ITROW                                                  CHORDF  00136
  100 JSUM = JSUM + JOC(I)                                              CHORDF  00137
      JSUM = JSUM - JOC(ITROW) + 1                                      CHORDF  00138
      IND = 0                                                           CHORDF  00139
      DO 200 I=IST,NK                                                   CHORDF  00140
      IX = I                                                            CHORDF  00141
      IND = IND + 1                                                     CHORDF  00142
      IF(.NOT.COPLAN.AND.J.GT.MYBW) IX = I + IOVLAP                     CHORDF  00143
      ISUB = JSUM + J - JS(IX) - NC + 1                                 CHORDF  00144
      X(IND) = I                                                        CHORDF  00145
      AVPS(IND) = DELPHI(ISUB)                                          CHORDF  00146
      JSUM = JSUM + JOC(IX)                                             CHORDF  00147
  200 CONTINUE                                                          CHORDF  00148
C                                                                       CHORDF  00149
C         FIND THE DERIVATIVE OF DELPHI, AND SMOOTH THESE               CHORDF  00150
C                                                                       CHORDF  00151
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      VC = AVPS(1)                                                      CHORDF  00152
      INDM1 = IND -1                                                    CHORDF  00153
      AVPA = 0.5 * (AVPS(1) + AVPS(2))                                  CHORDF  00154
      AVPS(1) = (AVPS(2) - AVPS(1))/(X(2) - X(1))                       CHORDF  00155
      DO 350 I=2,INDM1                                                  CHORDF  00156
      AVPB = 0.5 * (AVPS(I) + AVPS(I-1))                                CHORDF  00157
      AVPS(I) = AVPB - AVPA                                             CHORDF  00158
      AVPA = AVPB                                                       CHORDF  00159
  350 CONTINUE                                                          CHORDF  00160
      AVPS(IND) = (AVPS(IND) - AVPA)/0.5                                CHORDF  00161
      IND = IND + 1                                                     CHORDF  00162
      INDM1 = INDM1 + 1                                                 CHORDF  00163
      AVPS(IND) = AVPS(INDM1)                                           CHORDF  00164
      X(IND) = X(INDM1) + 0.5                                           CHORDF  00165
C                                                                       CHORDF  00166
      XINC = X(1)                                                       CHORDF  00167
      DO 375 I=1,IND                                                    CHORDF  00168
      X(I) = X(I) - XINC                                                CHORDF  00169
  375 CONTINUE                                                          CHORDF  00170
      IDEG = NDEG                                                       CHORDF  00171
C                                                                       CHORDF  00172
C         CALL FITTING ROUTINE LEAST SQUARES ERROR CURVE                CHORDF  00173
C                                                                       CHORDF  00174
      CALL CURVE(IDEG,IND,X,AVPS,A)                                     CHORDF  00175
C                                                                       CHORDF  00176
C         EVALUATE THE CURVE FOR SMOOTH DELPHI VALUES                   CHORDF  00177
C                                                                       CHORDF  00178
      MDEG = IDEG + 1                                                   CHORDF  00179
      JSUM = 0                                                          CHORDF  00180
      DO 400 I=1,ITROW                                                  CHORDF  00181
  400 JSUM = JSUM + JOC(I)                                              CHORDF  00182
C                                                                       CHORDF  00183
      JSUM = JSUM - JOC(ITROW) + 1                                      CHORDF  00184
      DO 500 I = IST,NK                                                 CHORDF  00185
      IX = I                                                            CHORDF  00186
      IF(.NOT.COPLAN.AND.J.GT.MYBW) IX = I + IOVLAP                     CHORDF  00187
      ISUB = JSUM + J - JS(IX) - NC + 1                                 CHORDF  00188
      VP = VC                                                           CHORDF  00189
      XV = FLOAT(I) - XINC                                              CHORDF  00190
      XP = 1.0                                                          CHORDF  00191
      DO 450 L = 1,MDEG                                                 CHORDF  00192
      XP = XP * XV                                                      CHORDF  00193
      XD = L                                                            CHORDF  00194
      XPI = XP/XD                                                       CHORDF  00195
      VP = VP + A(L) * XPI                                              CHORDF  00196
  450 CONTINUE                                                          CHORDF  00197
      DELPHI(ISUB) = VP                                                 CHORDF  00198
      JSUM = JSUM + JOC(IX)                                             CHORDF  00199
  500 CONTINUE                                                          CHORDF  00200
C                                                                       CHORDF  00201
C         CALCULATE THE TRAILING EDGE VELOCITY POTENTIALS (TVP ARRAY)   CHORDF  00202
C                                                                       CHORDF  00203
      L = J                                                             CHORDF  00204
      IF(NSUBDV.NE.1) L = NSUBDV * (J-1) + NSUBCN                       CHORDF  00205
      TVP(L) = (0.,0.)                                                  CHORDF  00206
      JJ = J                                                            CHORDF  00207
      JC = J                                                            CHORDF  00208
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      IF(J.GT.MYBW) JC = J - MYBW                                       CHORDF  00209
      I  = TEXLOC(JJ)                                                   CHORDF  00210
      XINCR = TEXLOC(JJ) - I                                            CHORDF  00211
      IROW = I                                                          BCSCFA  00001
      IF(.NOT.COPLAN.AND.J.GT.MYBW) I = I + IOVLAP                      CHORDF  00212
      INDB = IPNTRM(1,I) + JC- IPNTRM(2,I)                              CHORDF  00213
C                                                                       CHORDF  00214
C         TEST FOR 3 BOXES ON CHORD JJ                                  CHORDF  00215
      IF(NOC(JJ).LT.3) GO TO 940                                        CHORDF  00216
C                                                                       CHORDF  00217
C         2 BOXES AND NO MACH RAY AVAILABLE, OR                         BCSCFA  00002
C         3 BOXES OR MORE.  DO LINEAR EXTRAPOLATION.                    CHORDF  00218
  900 CONTINUE                                                          BCSCFA  00003
      INDE = IPNTRM(1,I-1) + JC - IPNTRM(2,I-1)                         CHORDF  00219
      SDELPH = DELPHI(INDB) - DELPHI(INDE)                              CHORDF  00220
      GO TO 950                                                         CHORDF  00221
C                                                                       CHORDF  00222
C         TEST FOR MACH RAY EXTRAPOLATION.                              CHORDF  00223
  940 CONTINUE                                                          CHORDF  00224
      IB = IS(JJ-1)                                                     CHORDF  00225
      IX = IB + NOC(JJ-1) - 1                                           CHORDF  00226
      IF (IROW .LT. IB .OR. IROW .GT. IX) GO TO 945                     BCSCFA  00004
      IB = IS(JJ-2)                                                     CHORDF  00228
      IX = IB + NOC(JJ-2) + 1                                           CHORDF  00229
      IM1 = IROW-1                                                      BCSCFA  00005
      IF (IM1 .GE. IB .AND. IM1 .LE. IX) GO TO 948                      BCSCFA  00006
C                                                                       BCSCFA  00007
C         MACH RAY CANNOT BE USED.  TEST FOR 2 BOXES ON CHORD JJ        BCSCFA  00008
  945 CONTINUE                                                          BCSCFA  00009
      IF (NOC(JJ) .LT. 2) GO TO 7010                                    BCSCFA  00010
      GO TO 900                                                         BCSCFA  00011
C                                                                       CHORDF  00232
C         MACH RAY CAN BE USED                                          CHORDF  00233
  948 CONTINUE                                                          BCSCFA  00012
      INDA = IPNTRM(1,I-1) + JC - IPNTRM(2,I-1) - 2                     CHORDF  00234
      INDC = IPNTRM(1,I) + JC - IPNTRM(2,I) -1                          CHORDF  00235
      SDELPH = 2.0*DELPHI(INDC) - DELPHI(INDA) - DELPHI(INDB)           CHORDF  00236
  950 CONTINUE                                                          CHORDF  00237
      JT = JJ                                                           CHORDF  00238
      IF(NSUBDV.NE.1) JT = NSUBDV * (JJ-1) + NSUBCN                     CHORDF  00239
      TVP(JT) = DELPHI(INDB) + XINCR*SDELPH                             CHORDF  00240
  980 CONTINUE                                                          CHORDF  00241
C                                                                       CHORDF  00242
 1000 CONTINUE                                                          CHORDF  00243
C                                                                       CHORDF  00244
C         WRITE THE DELPHI AND TVP ARRAY ON THE NIVPSC FILE             CHORDF  00245
      CALL RDINIT                                                       CHORDF  00246
      ITYPE = 5HMIXED                                                   CHORDF  00247
      N = IPNTRM(1,NMACHS) - 1                                          CHORDF  00248
      MXARRY = 6HDELPHI                                                 CHORDF  00249
      CALL WRTEMX(NIVPSC,MXWRIT,RANDCU,NFS,NAS,LS,NWR,LWS,2,ID,         CHORDF  00250
     1            DELPHI,ITYPE,2,N,PARM,IRR)                            CHORDF  00251
      IF(IRR.NE.0) GO TO 6040                                           CHORDF  00252
C                                                                       CHORDF  00253
      MTVPS = NSUBDV * NCARDS                                           CHORDF  00254
      N = MTVPS                                                         CHORDF  00255
      MXARRY = 6HTVP                                                    CHORDF  00256
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      CALL WRTEMX(NIVPSC,MXWRIT,RANDOU,NFS,NMS,LS,NMR,LWS,2,ID,          CHORDF 00257
     1            TVP,   ITYPE,2,N,PARM,IRR)                            CHORDF 00258
      IF(IRR.NE.0) GO TO 6040                                           CHORDF 00259
C                                                                       CHORDF 00260
C         PRINT THE SMOOTHED VEL. POT. ARRAY                            CHORDF 00261
C                                                                       CHORDF 00262
      IF(.NOT.PRVP) GO TO 1500                                          CHORDF 00263
      TITL(1) = 8H    WING                                              CHORDF 00264
      TITL(2) =10HVELOCITY P                                            CHORDF 00265
      TITL(3) =10HOTENTIALS                                             CHORDF 00266
      IF(COPLAN) TITL(1) = 10HWING/TAIL                                 CHORDF 00267
      CALL PRINTR(TITL,NM,DELPHI,1,1,MXB,MYBW,IPNTRM)                   CHORDF 00268
      IF(NSURF.EQ.1.OR.COPLAN) GO TO 1500                               CHORDF 00269
      TITL(1) = 8H   TAIL                                               CHORDF 00270
      CALL PRINTR(TITL,NM,DELPHI,1,IFBT,MXBT,MYBT,IPNTRM(1,IOVLAP+1))   CHORDF 00271
 1500 CONTINUE                                                          CHORDF 00272
      IF(.NOT.CHECKPR) GO TO 2000                                       CHORDF 00273
      WRITE(NT6,9400) (TVP(I),I=1,NTVPS)                                CHORDF 00274
 9400 FORMAT(//(1X,8E16.8))                                             CHORDF 00275
C                                                                       CHORDF 00276
 2000 CONTINUE                                                          CHORDF 00277
C                                                                       CHORDF 00278
      END FILE NIVPSC                                                   CHORDF 00279
      REWIND NIVPSC                                                     CHORDF 00280
C         CHANGE FILE NAMES                                             CHORDF 00281
C                                                                       CHORDF 00282
      IAICSC = IVPSC                                                    CHORDF 00283
      IVPSC = NIVPSC                                                    CHORDF 00284
C                                                                       CHORDF 00285
      RETURN                                                            CHORDF 00286
 9010 CONTINUE                                                          CHORDF 00287
      WRITE (NT6,9010) IGEOSC,IRR                                       CHORDF 00288
      WRITE (NT6,9011) MXARRY                                           CHORDF 00289
      GO TO 6100                                                        CHORDF 00290
 9020 CONTINUE                                                          CHORDF 00291
      WRITE (NT6,9010) MODESC,IRR                                       CHORDF 00292
      WRITE (NT6,9011) MXARRY                                           CHORDF 00293
      GO TO 6100                                                        CHORDF 00294
 9040 CONTINUE                                                          CHORDF 00295
      WRITE (NT6,9010) IVPSC,IRR                                        CHORDF 00296
      WRITE (NT6,9041) NM                                               CHORDF 00297
 6100 CONTINUE                                                          CHORDF 00298
      WRITE (NT6,9101) ID(1),ID(2)                                      CHORDF 00299
      WRITE (NT6,9102) PARM,IPARM                                       CHORDF 00300
      WRITE (NT6,9103) NFS,NMS                                          CHORDF 00301
      WRITE (NT6,9104) ITYPE,M,N                                        CHORDF 00302
      WRITE (NT6,9900)                                                  CHORDF 00303
      GO TO 8000                                                        CHORDF 00304
C                                                                       CHORDF 00305
 7010 CONTINUE                                                          CHORDF 00306
      WRITE (NT6,8020)                                                  CHORDF 00307
      WRITE (NT6,8021) IROW,JC                                          BCSCFA 00013
C                                                                       CHORDF 00309
 8000 CONTINUE                                                          CHORDF 00310
      CALL FLUSH(1)                                                     CHORDF 00311
C                                                                       CHORDF 00312
 8020 FORMAT(73H0*** ERROR - NO TIP TRAILING EDGE VELOCITY POTENTIAL CAN CHORDF 00313
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   1 BE COMPUTED. *** )                                                  CHORDF  00314
8021 FORMAT(5X,13HCOORDINATES (I2,1H,I2,1H) )                            CHORDF  00315
9010 FORMAT(53H0*** ERROR - WHILE READING THE GEOMETRY SCRATCH FILE A10  CHORDF  00316
   1, 15H, ERROR CODE = I4,4H *** )                                      CHORDF  00317
9011 FORMAT(5X,32HAN ATTEMPT WAS MADE TO READ THE A6, 8H MATRIX.//)      CHORDF  00318
9041 FORMAT(5X,54HAN ATTEMPT WAS MADE TO READ THE VEL. POT. ARRAY NUMBE  CHORDF  00319
   1R I3,1H. )                                                           CHORDF  00320
9050 FORMAT(56H0*** ERROR - WHILE WRITING ON THE VEL. POT. SCRATCH FILE  CHORDF  00321
   1       A10, 15H, ERROR CODE = I4,4H *** )                            CHORDF  00322
9051 FORMAT(5X,36HATTEMPTING TO WRITE VEL. POT. NUMBER I3 )              CHORDF  00323
9101 FORMAT(5X,*MATRIX ID = *, A10, I10)                                 CHORDF  00324
9102 FORMAT(5X,*PARAMETERS *,10E11.3, / 10X,*(INTEGER)*, I7, 9I11 )      CHORDF  00325
9103 FORMAT(5X,*FILE SPACING = *,I3,* MATRIX SPACING = *,I3 )            CHORDF  00326
9104 FORMAT(5X,*MATRIX TYPE =*,A10,*, DIMENSIONED (*I4,2H X,I4,1H) )     CHORDF  00327
9900 FORMAT(*0     ERROR OCCURRED IN CHORD-FIT SMOOTHING SECTION. * )    FTNX1  00074
     END                                                                 CHORDF  00329
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      SUBROUTINE PRINTR(TITL,IMODE,ARRAY,K,IXB,MXB,MYB,IPNTRM)          PRINTR  00002
C                                                                       PRINTR  00003
C         TITL   - TITLE TO PRINT FOR THE ARRAY                         PRINTR  00004
C         IMODE  - MODE SHAPE NUMBER                                    PRINTR  00005
C         ARRAY  - ARRAY TO BE PRINTED                                  PRINTR  00006
C                                                                       PRINTR  00007
      DIMENSION ARRAY(K,1), TITL(3)                                     PRINTR  00008
      COMPLEX ARRAY                                                     PRINTR  00009
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,         FILES   00002
     1                IOUFSP,MODESC,IVFSC,IGEOSC,IWTFSC,IAICSC         FILES   00003
      COMMON /CONTRL/ PREVEX,OMACH, TITLE(8), PRVGEOM,PRVMODE,DIHW,DIHT, CONTRL  00002
     1               DEFAULT                                            CONTRL  00003
      LOGICAL    PRVGEOM,PRVMODE,DIHW,DIHT,DEFAULT                      CONTRL  00004
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,    PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                               PROBLM  00003
      LOGICAL         SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                 PROBLM  00004
      COMMON /KVAL  / IKVAL,XKVAL(20), XKS(20)                          KVAL    00002
      DIMENSION IPNTRM(2,50)                                            PRINTR  00015
      DIMENSION PC(2)                                                   PRINTR  00016
      DIMENSION S(50),D(50)                                             PRINTR  00020
      EQUIVALENCE (S(1),BUFF(1)),(D(1),BUFF(1251))                      PRINTR  00021
      REAL K1                                                           PRINTR  00022
      INTEGER PAGE                                                      PRINTR  00023
      COMMON /RWBUFF/ BFCODE,IBFCNT,  BUFF(3280)                        RWBUFF  00002
      DATA   PC    / 1OHPAGE CONTI,4HNUED /                             FTNX1   00076
      DATA   BLANK / 1H  /                                              FTNX1   00077
      DATA   XINIT / -1.0 /                                             FTNX1   00078
      K1 = XKVAL(IKVAL)                                                 PRINTR  00024
      IF(XKS(IKVAL).NE.XINIT) K1 = XKS(IKVAL)                           PRINTR  00025
      PAGE = 0                                                          PRINTR  00026
      N =1                                                              PRINTR  00027
      M =4                                                              PRINTR  00028
      IF(M.GT.MYB) M = MYB                                              PRINTR  00029
  100 LINE = 100                                                        PRINTR  00030
  200 CONTINUE                                                          PRINTR  00031
      DO 1400 I=IXB,MXB                                                 PRINTR  00032
      DO 300 J=N,M                                                      PRINTR  00033
      S(J) = 0.0                                                        PRINTR  00034
      D(J) = 0.0                                                        PRINTR  00035
  300 CONTINUE                                                          PRINTR  00036
      IF(LINE.LE.50) GO TO 900                                          PRINTR  00037
      PAGE = PAGE + 1                                                   PRINTR  00038
      LINE = 4                                                          PRINTR  00039
      WRITE (NT6,9001) TITLE,TITL,XMACH,K1,IMODE                        PRINTR  00040
C                                                                       PRINTR  00041
      IF(PAGE.EQ.1) GO TO 700                                           PRINTR  00042
      WRITE (NT6,9005) PC                                               PRINTR  00043
      GO TO 800                                                         PRINTR  00044
  700 WRITE(NT6,9005)                                                   PRINTR  00045
  800 CONTINUE                                                          PRINTR  00046
      WRITE(NT6,6006) (BLANK,J,J=N,M)                                   PRINTR  00047
      WRITE(NT6,6007) (BLANK,  J=N,M)                                   PRINTR  00048
  900 CONTINUE                                                          PRINTR  00049
      JS = IPNTRM(2,I)                                                  PRINTR  00050
      IF(JS .LE. 0) GO TO 1400                                          PRINTR  00051
      IDX = IPNTRM(1,I)                                                 PRINTR  00052
      JE =IPNTRM(1,I+1) - IDX + JS -1                                   PRINTR  00053
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      IF(JE.EQ.0) GO TO 1400                                          PRINTR  00054
      DO 1000 J=JS,JE                                                 PRINTR  00055
      S(J) =  REAL(ARRAY(1,IDX))                                      PRINTR  00056
      D(J) = AIMAG(ARRAY(1,IDX))                                      PRINTR  00057
      IDX = IDX +1                                                    PRINTR  00058
 1000 CONTINUE                                                        PRINTR  00059
      DO 1200 J=N,M                                                   PRINTR  00060
      IF(S(J)) 1300,1100,1300                                         PRINTR  00061
 1100 CONTINUE                                                        PRINTR  00062
      IF(D(J)) 1300,1200,1300                                         PRINTR  00063
 1200 CONTINUE                                                        PRINTR  00064
      GO TO 1400                                                      PRINTR  00065
 1300 WRITE (NT6,9013) I,(S(J),D(J),J=N,M)                            PRINTR  00066
      LINE = LINE + 1                                                 PRINTR  00067
 1400 CONTINUE                                                        PRINTR  00068
      M = M+4                                                         PRINTR  00069
      N = N+4                                                         PRINTR  00070
      IF(N.GT.MYB) GO TO 1500                                         PRINTR  00071
      IF(M.GT.MYB) M = MYB                                            PRINTR  00072
      IF(LINE.GT.45) GO TO 100                                        PRINTR  00073
      WRITE(NT6,6006) (BLANK,J,J=N,M)                                 PRINTR  00074
      WRITE(NT6,6007) (BLANK,  J=N,M)                                 PRINTR  00075
      LINE = LINE+3                                                   PRINTR  00076
      GO TO 200                                                       PRINTR  00077
 1500 CONTINUE                                                        PRINTR  00078
      RETURN                                                          PRINTR  00079
 9001 FORMAT(1H1,20X,8A10/ 46X,*SMOOTHED *,3A10/ 46X,7H( MACH F5.3,5X,  PRINTR  00080
     1   12HFRED. FREQ. =,F8.5, * )* / 52X,**ODE   SHAPE*, I3)        PRINTR  00081
 9005 FORMAT(44X,42(1H-),20X,A10,A4)                                  PRINTR  00082
 6006 FORMAT(4HOROW, A1,14X,5HCHORD,I3, 3(A1,22X,5HCHORD,I3) )        PRINTR  00083
 6007 FORMAT(3X, 4(A1,9X,4HREAL,8X,9HIMAGINARY) )                     PRINTR  00084
 9013 FORMAT(I4,8E16.8)                                               PRINTR  00085
      END                                                             PRINTR  00086
```

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      SUBROUTINE CURVE(M,N,X,Z,C)                                       CURVE   00002
      DIMENSION X(50), Z(2,50), C(2,21)                                 CURVE   00003
      DIMENSION AI(23), A(21,23), XP(6)                                 CURVE   00004
C                                                                       CURVE   00005
C         M  - DEGREE OF POLYNOMIAL EQUATION                            CURVE   00006
C         N  - NUMBER OF DATA POINTS TO FIT CURVE THROUGH               CURVE   00007
C         X  - X COORDINATE OF DATA POINT                               CURVE   00008
C         Z  - Z COORDINATE                                             CURVE   00009
C         C  - OUTPUT COEFFICIENT ARRAY                                 CURVE   00010
C                                                                       CURVE   00011
      EPS = 1.0E-04                                                     CURVE   00012
      IF(N.LT.M+1) M = N-1                                              CURVE   00013
      NC = M + 1                                                        CURVE   00014
C                                                                       CURVE   00015
C         ZERO OUT THE ARRAYS NEEDED                                    CURVE   00016
C                                                                       CURVE   00017
      ITOT = NC + 2                                                     CURVE   00018
      DO 100 I=1,NC                                                     CURVE   00019
      C(1,I) = 0.0                                                      CURVE   00020
      C(2,I) = 0.0                                                      CURVE   00021
   90 CONTINUE                                                          CURVE   00022
      DO 100 J=1,ITOT                                                   CURVE   00023
      A(I,J) = 0.0                                                      CURVE   00024
  100 CONTINUE                                                          CURVE   00025
C                                                                       CURVE   00026
C         DETERMINE DEVIATION EQUATION AND SQUARE THE EQUATION          CURVE   00027
C                                                                       CURVE   00028
      AI(1) = 1.00                                                      CURVE   00029
      DO 400 K=1,N                                                      CURVE   00030
      AI(1) = 1.0                                                       CURVE   00031
      DO 200 L=2,NC                                                     CURVE   00032
      AI(L) = AI(L-1) * X(K)                                            CURVE   00033
  200 CONTINUE                                                          CURVE   00034
      AI(NC+1) = Z(1,K)                                                 CURVE   00035
      AI(NC+2) = Z(2,K)                                                 CURVE   00036
C                                                                       CURVE   00037
      DO 300 I=1,NC                                                     CURVE   00038
      DO 300 J=1,ITOT                                                   CURVE   00039
      ASAV = AI(I) * AI(J)                                              CURVE   00040
      A(I,J) = A(I,J) + ASAV                                            CURVE   00041
  300 CONTINUE                                                          CURVE   00042
  400 CONTINUE                                                          CURVE   00043
C                                                                       CURVE   00044
C         SQUARE ROOT METHOD INTERMEDIATE MATRIX                        CURVE   00045
C                                                                       CURVE   00046
      DO 1200 I=1,NC                                                    CURVE   00047
      IM1 = I-1                                                         CURVE   00048
      TMP = 0.0                                                         CURVE   00049
      IF(I.EQ.1) GO TO 600                                              CURVE   00050
      DO 500 L=1,IM1                                                    CURVE   00051
  500 TMP = TMP + A(L,I) ** 2                                           CURVE   00052
  600 CONTINUE                                                          CURVE   00053
      T= A(I,I) - TMP                                                   CURVE   00054
      IF(T.GT.EPS) GO TO 700                                            CURVE   00055
      A(I,I) = 0.0                                                      CURVE   00056
      GO TO 1200                                                        CURVE   00057
  700 CONTINUE                                                          CURVE   0005?
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      A(I,I) = SQRT(T)                                                  CURVE   00059
      IF(A(I,I).GT.EPS) GO TO 800                                       CURVE   00060
      A(I,ITOT) = 0.0                                                   CURVE   00061
      GO TO 1200                                                        CURVE   00062
  800 CONTINUE                                                          CURVE   00063
C                                                                       CURVE   00064
      JS = I+1                                                          CURVE   00065
      DO 1100 J=JS,ITOT                                                 CURVE   00066
      TMP = 0.0                                                         CURVE   00067
      IF(I.EQ.1) GO TO 1000                                             CURVE   00068
      DO 900 L=1,IM1                                                    CURVE   00069
  900 TMP = TMP + A(L,I)*A(L,J)                                         CURVE   00070
 1000 A(I,J) = (A(I,J)-TMP)/A(I,I)                                      CURVE   00071
 1100 CONTINUE                                                          CURVE   00072
 1200 CONTINUE                                                          CURVE   00073
C                                                                       CURVE   00074
C         BACK SUBSTITUTE FOR COEFFICIENTS                              CURVE   00075
C                                                                       CURVE   00076
      DO 1600 K=1,NC                                                    CURVE   00077
      I = NC - K + 1                                                    CURVE   00078
      IP1 = I + 1                                                       CURVE   00079
      TMP1 = 0.0                                                        CURVE   00080
      TMP2 = 0.0                                                        CURVE   00081
      IF(A(I,I).GT.EPS) GO TO 1300                                      CURVE   00082
      C(1,I) = 0.0                                                      CURVE   00083
      C(2,I) = 0.0                                                      CURVE   00084
      GO TO 1600                                                        CURVE   00085
 1300 CONTINUE                                                          CURVE   00086
      IF(I.EQ.NC) GO TO 1500                                            CURVE   00087
      DO 1400 L=IP1,NC                                                  CURVE   00088
      TMP1 = TMP1 + A(I,L) * C(1,L)                                     CURVE   00089
      TMP2 = TMP2 + A(I,L) * C(2,L)                                     CURVE   00090
 1400 CONTINUE                                                          CURVE   00091
 1500 CONTINUE                                                          CURVE   00092
      C(1,I) = (A(I,NC+1)-TMP1)/A(I,I)                                  CURVE   00093
      C(2,I) = (A(I,ITOT)-TMP2)/A(I,I)                                  CURVE   00094
 1600 CONTINUE                                                          CURVE   00095
      RETURN                                                            CURVE   00096
      END                                                               CURVE   00097
```

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      OVERLAY(AFMBOX,1,10)                                                  FORCES  00002
      PROGRAM FORCES                                                        FORCES  00003
C                                                                           FORCES  00004
C         THIS PROGRAM CALCULATES BOX LIFTS, SECTION LIFTS, TOTAL LIFT,     FORCES  00005
C         AND GENERALIZED AIR FORCES. THE PROGRAM MUST READ INFORMATION     FORCES  00006
C         FROM THE GEOMETRY SCRATCH FILE AND THE MODE SCRATCH FILE.         FORCES  00007
C                                                                           FORCES  00008
      COMMON /ARRAYS/ KBXCDW,LBXCDW,LBOXC,KBXCDT,LBXCDT,KJALPH,LJALPH,      ARRAYS  00002
     1                KALPHA,KKERNL,LKERNL,KPNTRM,LPNTRM,KDEFSL,KELPHI,     ARRAYS  00003
     2                LMODES,KPNTSD,LPNTSD,KSDW,LSDW,KPNTDW,LPNTDW,         ARRAYS  00004
     3                KDW,LDW,KTVP,LTVP                                     ARRAYS  00005
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,             FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC              FILES   00003
      EQUIVALENCE (IWTFSC,ITSLSC)                                           FORCES  00011
      COMMON /IOCONT/ OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,          IOCONT  00002
     1                PRPAIC,PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,           IOCONT  00003
     2                PRBL,PRDCP,PRGNAF,PRGNAC,PRSL,PRLW,PRNW,PRCM          BCSFRB  00001
      EQUIVALENCE (PRUW,PRDW)                                               IOCONT  00005
      LOGICAL   OPLAIC,OSPAIC,WTGEOM,WTGNAF,WTSL,WTBL,PRBOX,PRPAIC,         IOCONT  00006
     1          PRSAIC,PRMODS,PRCOEF,PRDW,PRSW,PRVP,PRBL,PRSL,PRGNAF,       IOCONT  00007
     2          PRDCP,PRGNAC,PRUW,PRLW,PRNW,PRCM                            BCSFRB  00002
      COMMON / KERN / ERR,MXSKRN,IPKERN,NPLKRN,NSPATK,NROWEA                KERN    00002
      COMMON /KVAL  / IKVAL,XKVAL(20), XKS(20)                              KVAL    00002
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,        PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                                   PROBLM  00003
      LOGICAL         SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                     PROBLM  00004
      COMMON / MODES/ SYM,SYMT,MTYPEW,MTYPET                                MODCOM  00002
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,             GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,                  GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,             GEOMTY  00004
     3                IXBW,XCENTR                                           GEOMTY  00005
      LOGICAL COPLAN                                                        GEOMTY  00006
      COMMON /GEOM2 / TLAX,TLAZ,PSIT,MXBT,MYBT,MYBBT,MXBST,MYBST,           GEOM2   00002
     1                MYBBST,IXBT,IXBST,CAFL                                GEOM2   00003
      COMMON /TAPEIO/ NFS,NMS,LS,NMR,ID(20),NID,ITYPE,LRS,LWS,N,N,          TAPEIO  00002
     1                PARM(10),IRR                                          TAPEIO  00003
      DIMENSION IPARM(10)                                                   TAPEIO  00004
      EQUIVALENCE (PARM,IPARM)                                              TAPEIO  00005
      COMMON /CHECKPR/ DPPCPR,GEOCPR,MODCPR,AICCPR,NWSCPR,SMCPR,GAFCPR      CHECKPR 00002
      LOGICAL  DPPCPR, GEOCPR, MODCPR, AICCPR,NWSCPR,  SMCPR, GAFCPR        CHECKPR 00003
      EQUIVALENCE (CHECKPR,GAFCPR)                                          FORCES  00022
      LOGICAL CHECKPR                                                       FORCES  00023
      DIMENSION RWBF(1250)                                                  FORCES  00024
      EQUIVALENCE (RWBF,BUFF)                                               FORCES  00025
      COMPLEX RWBF                                                          FORCES  00026
      COMMON /LOCL/           XKVL                                          FORCES  00027
      COMMON      BLANK(1)                                                  FORCES  00028
      DIMENSION TITL(2)                                                     FORCES  00029
C                                                                           FORCES  00030
C             FEXLOC((MYBW+MYBT)*NSUBDV),TEXLOC(SAME)                       FORCES  00031
      DIMENSION FEXLOC(250), TEXLOC(250)                                    FORCES  00032
C             IPNTRM(2,NROWS)                                               FORCES  00033
      DIMENSION  IPNTRM(2,100)                                              FORCES  00034
C             IBOXW(NROWS,150/20) ,IBOXT(90,150/20)                         FORCES  00035
      DIMENSION IBOXW(150,8),        IBOXT(90,8)                            FORCES  00036
C             IBXCDF(NCOLS), IBXCD(NCOLS), IBXCDA(NCOLS)                    FORCES  00037
      DIMENSION IBXCDF(150),   IBXCD(150),   IBXCDA(150)                    FORCES  00038
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C               DEFSL(2,NBOXES),  DEFLTE(NCOLS)                                  FORCES  00039
      DIMENSION DEFSL(2,1000),    DEFLTE(50)                                     FORCES  00040
C               ALPHA(NCOLS*2*NSURF),  IJALPH(SAME)                              FORCES  00041
C               TSLFN(NBOXES)                                                    FORCES  00042
      DIMENSION TSLFN(1000)                                                      FORCES  00043
      DIMENSION ALPHA(200),   IJALPH(200)                                        FORCES  00044
C               DELPHI(NBOXES),TVP(NCOLS1+NCOLS2*NSUBDV)                         FORCES  00045
      COMPLEX   DELPHI(1000),  TVP(250)                                          FORCES  00046
C               BXLIFT(NBOXES), SLIFT(NCOLS*NMODES), GENAF(NMODES*NMODE)         FORCES  00047
      COMPLEX   BXLIFT(1000),   SLIFT(100), TLIFT,   GENAF(400),                 FORCES  00048
C               AFROW(NMODES)                                                    FORCES  00049
     1      AFROW(20), BL2, TLIFT1,TLIFT2                                       FORCES  00050
C               DELCP(NBOXES)                                                    FORCES  00051
      COMPLEX   DELCP(1000)                                                      FORCES  00052
C               GRAFC(NMODES*NMODES), GPPAFC(SAME)                               FORCES  00053
      DIMENSION GPAFC(400),           GPPAFC(400)                                FORCES  00054
C                                                                                FORCES  00055
      DIMENSION  AFC(2)                                                          FORCES  00056
      EQUIVALENCE (AFCSTR,AFC)                                                   FORCES  00057
C                                                                                BCSFRB  00008
      COMPLEX  SECMOM(100), GAF                                                  BCSFRB  00009
C                                                                                BCSFRB  00010
C               VPTE(NCOLS)                                                      FORCES  00058
      COMPLEX   VPTE(50),VPLE, TEMP1, TEMP2, TEMP3, BL                           FORCES  00059
      LOGICAL MXREAD,RANDIN,MXWRIT,RANDOU                                        FORCES  00060
      LOGICAL BLNEED                                                             FORCES  00061
      COMPLEX XINDEF                                                             FORCES  00062
      DIMENSION XINDFF(2)                                                        FTN01   00079
      EQUIVALENCE (XINDEF,XINDFF)                                                FTN01   00080
      COMMON /RWBUFF/ BFCODE,IBFCNT,  BUFF(3280)                                 RWBUFF  00002
      MXREAD = .FALSE.                                                           FORCES  00064
      RANDIN = .FALSE.                                                           FORCES  00065
      MXWRIT = .FALSE.                                                           FORCES  00066
      RANDOU = .FALSE.                                                           FORCES  00067
C                                                                                FORCES  00068
C                                                                                FORCES  00069
      XKVL = XKVAL(IKVAL)                                                        FORCES  00070
      BLNEED = WTBL .OR. PRBL .OR. PRSL .OR. PRDCP .OR. PRCM                     BCSFRB  00011
      TWOBET = (2.D0*B1BETA)/B1                                                  FORCES  00072
      TWOBB = TWOBET/B1                                                          FORCES  00073
C         CONSTANTS FOR AGARD GENERALIZED AERODYNAMIC COEFFICIENTS,              BCSFRA  00001
C         BASED ON WING SEMI-SPAN                                                BCSFRA  00002
      S     = MYBW * B1BETA                                                      BCSFRA  00003
      S3    = S*S*S                                                              FORCES  00076
      S4    = S*S3                                                               FORCES  00077
      BS3BET = -B1BETA/S3                                                        FORCES  00078
      BKS4BT = 0.D                                                               BCSFRA  00004
      IF (XKVL .EQ. 0.) GO TO 5                                                  BCSFRA  00005
      BKS4BT = -1. *(B1*B1BETA)/(XKVL*S4)                                        FORCES  00079
    5 CONTINUE                                                                   BCSFRA  00006
      NVPS = NMODES                                                              FORCES  00082
      MAX = NVPS * NMODES                                                        FORCES  00083
C                                                                                FORCES  00084
C                                                                                FORCES  00085
C                                                                                FORCES  00086
      REWIND MODESC                                                              FORCES  00087
      NMSPCE = 0                                                                 FORCES  00088
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C                                                                       FORCES  00089
C       READ THE POINTERS FROM THE MODESC FILE.                         FORCES  00090
C                                                                       FORCES  00091
      CALL RDINIT                                                       FORCES  00092
      ITYPE = SHMIXED                                                   FORCES  00093
      MXARRY = GHIPNTRM                                                 FORCES  00094
      CALL READMX(MODESC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,   FORCES  00095
     1            LRS,IPNTRM,M,N,FARM,IRR)                              FORCES  00096
      ICYLAP = IFARM(3)                                                 FORCES  00097
      NPNTRS = N                                                        FORCES  00098
      MXB = NPNTRS -1                                                   FORCES  00099
      MYB = MAXO(MYBW,MYBT)                                             FORCES  00100
      NBOXES = MYB * MXB                                                FORCES  00101
      IF(IRR.NE.0) GO TO 6020                                           FORCES  00102
C                                                                       FORCES  00103
C                                                                       FORCES  00104
      REWIND IGEOSC                                                     FORCES  00105
C                                                                       FORCES  00106
C       READ BOX CODES INTO STORAGE FROM GEOMETRY SCRATCH FILE          FORCES  00107
C                                                                       FORCES  00108
      CALL RDINIT                                                       FORCES  00109
      ITYPE = SHMIXED                                                   FORCES  00110
      MXARRY = GHIBOXW                                                  FORCES  00111
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,150,NID,ID,ITYPE, FORCES  00112
     1          LRS,IBOXW,M,N,FARM,IRR)                                 FORCES  00113
      IF(IRR.NE.0) GO TO 6010                                           FORCES  00114
C                                                                       FORCES  00115
      NPLS = 1                                                          FORCES  00116
      IF(NSURF.EQ.1.OR.COPLAN) GO TO 10                                 FORCES  00117
      NPLS = 2                                                          FORCES  00118
C                                                                       FORCES  00119
      CALL RDINIT                                                       FORCES  00120
      ITYPE = SHMIXED                                                   FORCES  00121
      MXARRY = GHIBOXT                                                  FORCES  00122
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR, 90,NID,ID,ITYPE, FORCES  00123
     1          LRS,IBOXT,M,N,FARM,IRR)                                 FORCES  00124
      IF(IRR.NE.0) GO TO 6010                                           FORCES  00125
C                                                                       FORCES  00126
   10 CONTINUE                                                          FORCES  00127
C                                                                       FORCES  00128
C       READ THE TEXLOC AND FEXLOC ARRAYS FROM THE GEOMETRY SCRATCH     FORCES  00129
C       FILE.  THESE ARE NEEDED TO INTERPOLATE VELOCITY POTENTIALS AT   FORCES  00130
C       BOX EDGES.                                                      FORCES  00131
C                                                                       FORCES  00132
      CALL RDINIT                                                       FORCES  00133
      ITYPE = SHMIXED                                                   FORCES  00134
      MXARRY = GHFEXLOC                                                 FORCES  00135
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,   FORCES  00136
     1            LRS,FEXLOC,M,N,FARM,IRR)                              FORCES  00137
      IF(IRR.NE.0) GO TO 6010                                           FORCES  00138
C                                                                       FORCES  00139
      CALL RDINIT                                                       FORCES  00140
      ITYPE = SHMIXED                                                   FORCES  00141
      MXARRY = GHTEXLOC                                                 FORCES  00142
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,   FORCES  00143
     1            LRS,TEXLOC,M,N,FARM,IRR)                              FORCES  00144
      IF(IRR.NE.0) GO TO 6010                                           FORCES  00145
```

```
C
C        READ AREAS AND POINTERS FOR AREAS FROM GEOMETRY SCRATCH FILE.
C        THESE ARE USED IN CALCULATION OF BOX LIFTS AND GEN. FORCES.
C
      CALL RDINIT
      ITYPE = SHMIXED
      MXARRY = GHALPHAS
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,
     1            LRS,ALPHA,M,N,PARM,IRR)
      IF(IRR.NE.0) GO TO 6010
C
      CALL RDINIT
      ITYPE = SHMIXED
      MXARRY = GHIJALPH
      CALL READMX(IGEOSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,
     1            LRS,IJALPH,M,N,PARM,IRR)
      NALPH = N
      NALPHW = IPARM(3)
      NALPHT = N - NALPHW
      IF(IRR.NE.0) GO TO 6010
C
C
C        REORDER THE FEXLOC AND TEXLOC ARRAYS SO THAT THERE ARE
C        VALUES FOR UNSUBDIVIDED CHORDS ONLY.
C
      IF(NSUBDV.EQ.1) GO TO 120
      XSLIDE = NSUBDV-IXBW
      JCOL = NSUBCN
      NCOLS = MYBW + MYBT
      DO 110 I=1,NCOLS
      TEXLOC(I) = (TEXLOC(JCOL)+XSLIDE)/XSUBDV
      FEXLOC(I) = (FEXLOC(JCOL)+XSLIDE)/XSUBDV
      JCOL = JCOL + NSUBDV
  110 CONTINUE
  120 CONTINUE
C
C        LOOP ON THICKNESS SLOPE FUNCTIONS (IF NONE WERE REQUESTED,
C        ONE DUMMY SET OF ONES WILL HAVE BEEN GENERATED.)
C
      REWIND ITSLSC
      DO 750 ITSLOP=1,NTSLOP
C
C        READ THICKNESS SLOPE FUNCTIONS
C
      CALL RDINIT
      ITYPE = 4HREAL
      MXARRY = GHTSLFN
      CALL READMX(ITSLSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,1,NID,ID,ITYPE,
     1            LRS,TSLFN,M,N,PARM,IRR)
      IF(IRR.NE.0) GO TO 6040
C
C        ZERO OUT THE AIR FORCES ARRAY
C
      DO 150 J=1,MAX
  150 GENAF(J) = (0.,0.)
C        LOOP ON NUMBER OF MODE SHAPES
      DO 650 NM=1,NMODES
```

FORCES 00146 … FORCES 00202

```
C                                                                       FORCES  00203
C         GET MODE SHAPE NM FROM MODESC SCRATCH FILE                    FORCES  00204
      CALL RDINIT                                                       FORCES  00205
      IF(NM.EQ.1) NMS = NMSPCE                                          FORCES  00206
      ITYPE = 4HREAL                                                    FORCES  00207
      MXARRY = 6HDEFSL                                                  FORCES  00208
      CALL READMX(MODESC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,   FORCES  00209
     1            LRS,DEFSL, M,N,PARM,IRR)                              FORCES  00210
      IF(IRR.NE.0) GO TO 6020                                           FORCES  00211
C                                                                       FORCES  00212
C                                                                       FORCES  00213
C                                                                       FORCES  00214
C         LOOP ON VELOCITY POTENTIALS                                   FORCES  00215
      REWIND IVPSC                                                      FORCES  00216
C                                                                       FORCES  00217
      DO 600 JVP=1,NVPS                                                 FORCES  00218
C                                                                       FORCES  00219
C         READ ONE SET OF VELOCITY POTENTIALS                           FORCES  00220
      CALL RDINIT                                                       FORCES  00221
      ITYPE = 4HREAL                                                    FORCES  00222
      MXARRY = 6HDELPHI                                                 FORCES  00223
      CALL READMX(IVPSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,    FORCES  00224
     1            LRS,DELPHI,M,N,PARM,IRR)                              FORCES  00225
      IF(IRR.NE.0) GO TO 6030                                           FORCES  00226
C                                                                       FORCES  00227
      CALL RDINIT                                                       FORCES  00228
      ITYPE = 4HREAL                                                    FORCES  00229
      MXARRY = 3HTVP                                                    FORCES  00230
      CALL READMX(IVPSC,MXREAD,RANDIN,NFS,NMS,LS,NMR,2,NID,ID,ITYPE,    FORCES  00231
     1            LRS,TVP,M,N,PARM,IRR)                                 FORCES  00232
C                                                                       FORCES  00233
      IF(IRR.NE.0) GO TO 6030                                           FORCES  00234
C                                                                       FORCES  00235
C         CONDENSE THE TRAILING EDGE VELOCITY POTENTIAL ARRAY TO        FORCES  00236
C         UNSUBDIVIDED BOXES.                                           FORCES  00237
C         ALSO ZERO OUT THE SECTIONAL GENERALIZED FORCES.               BCSFRB  00012
C                                                                       BCSFRB  00013
      NTVPS = MYBW + MYBT                                               BCSFRB  00014
      DO 210 I=1,NTVPS                                                  BCSFRB  00015
      SECMOM(I) = (0.,0.)                                               BCSFRB  00016
  210 CONTINUE                                                          BCSFRB  00017
C                                                                       FORCES  00238
      IF(NSUBDV.EQ.1) GO TO 220                                         FORCES  00239
      JCOL = NSUBCN                                                     FORCES  00240
      DO 215 I=1,NTVPS                                                  FORCES  00242
      TVP(I) = TVP(JCOL)                                                FORCES  00243
      JCOL = JCOL + NSUBDV                                              FORCES  00244
  215 CONTINUE                                                          FORCES  00245
  220 CONTINUE                                                          FORCES  00246
C                                                                       FORCES  00247
C         ZERO OUT THE BOX LIFT ARRAY                                   FORCES  00248
C                                                                       FORCES  00249
      IF(NM.NE.1) GO TO 240                                             FORCES  00250
      IF (.NOT. BLNEED) GO TO 240                                       FORCES  00251
      NBX = IPNTRM(1,NPNTRS) - 1                                        FORCES  00252
      DO 230 I=1,NBX                                                    FORCES  00253
      DELCP(I) = (0.,0.)                                                FORCES  00254
```

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  230 BXLIFT(I) = (0.,0.)                                                  FORCES  00255
  240 CONTINUE                                                             FORCES  00256
C                                                                          FORCES  00257
C                                                                          FORCES  00258
C*************************************************************************FORCES  00259
C                                                                          FORCES  00260
C         THE FOLLOWING BLOCK OF CODE COMPUTES                             FORCES  00261
C           BXLIFT  - BOX LIFTS                                            FORCES  00262
C           SLIFT   - SECTION (CHORD) LIFTS                                FORCES  00263
C           TLIFT   - TOTAL LIFT                                           FORCES  00264
C           GENAF   - GENERALIZED AIRFORCES                                FORCES  00265
C                                                                          FORCES  00266
C*************************************************************************FORCES  00267
C                                                                          FORCES  00268
      AFROW(JVP) = (0.,0.)                                                 FORCES  00269
C             AFROW  = CURRENT ROW OF GENERALIZED AIRFORCES                FORCES  00270
C                                                                          FORCES  00271
C         SET UP INITIAL CONDITIONS FOR DOUBLE LOOP OVER THE ENTIRE        FORCES  00272
C         BOX PATTERN                                                      FORCES  00273
C              IBXCDF = FORWARD                                            FORCES  00274
C              IBXCD  = CENTER    ROWS OF BOX CODES, EXPANDED              FORCES  00275
C              IBXCDA = AFT     /                                          FORCES  00276
C              VPLE   = VELOCITY POTENTIAL AT BOX LEADING EDGE             FORCES  00277
C              VPTE   = ARRAY OF BOX TRAILING EDGE VELOCITY POTENTIALS     FORCES  00278
C                                                                          FORCES  00279
      DO 565 NP=1,NPLS                                                     FORCES  00280
      IF (NP.EQ.2) GO TO 245                                               FORCES  00281
      ISROWA = 1                                                           FORCES  00282
      NBXA = IPNTRM(1,2)                                                   FORCES  00283
      CALL DCODER(IBOXW,150,ISROWA,1,ISROWA,NBXA,.F.,IBXCDA)               FORCES  00284
      NBX = NBXA                                                           FORCES  00285
      GO TO 250                                                            FORCES  00286
  245 CONTINUE                                                             FORCES  00287
      ISROWA = (IXBT-IXBW)/NSUBDV + 1                                      FORCES  00288
      IXBUT = ISROWA                                                       FORCES  00289
      IDEX = ISROWA + IOVLAP                                               FORCES  00290
      NBXA = IPNTRM(1,IDEX+1) - IPNTRM(1,IDEX)                             FORCES  00291
      ISUBT = 2-IXBST                                                      FORCES  00292
      CALL DCODER(IBOXT(ISUBT,1),LBXCDT,ISROWA,1,ISROWA,NBXA,.F.,IBXCDA)   FORCES  00293
      NBX = NBXA                                                           FORCES  00294
  250 CONTINUE                                                             FORCES  00295
      DO 270 JCOL = 1,NBXA                                                 FORCES  00296
      IBXCD(JCOL) = IBXCDA(JCOL)                                           FORCES  00297
      IF (IBXCDA(JCOL) .EQ. 1) GO TO 260                                   FORCES  00298
      VPTE(JCOL) = XINDEF                                                  FORCES  00299
      DEFLTE(JCOL) = XINDEF                                                FORCES  00300
      GO TO 270                                                            FORCES  00301
  260 CONTINUE                                                             FORCES  00302
      VPTE(JCOL) = (0.,0.)                                                 FORCES  00303
      IDC = JCOL                                                           FORCES  00304
      DEFLTE(JCOL) = DEFSL(1,IDC) + DEFSL(2,IDC)*B1*(FEXLOC(JCOL)-1.0)     FORCES  00305
  270 CONTINUE                                                             FORCES  00306
C                                                                          FORCES  00307
C                                                                          FORCES  00308
C         LOOP ON ROWS OF THE BOX PATTERN                                  FORCES  00309
      IF(NP.EQ.2) GO TO 275                                                FORCES  00310
      IRS = 1                                                              FORCES  00311
```

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      NXBT = NXBW                                                       FORCES  00312
      IF(COPLAN) NXBT = NXBT                                            FORCES  00313
      NROWS = NXBT                                                      FORCES  00314
      GO TO 280                                                         FORCES  00315
  275 CONTINUE                                                          FORCES  00316
      IRS  = (IXBT-IXBW)/NSUBDV + 1 + IOVLAP                            FORCES  00317
      NXBT = NXBT + IOVLAP                                              FORCES  00318
  280 CONTINUE                                                          FORCES  00319
      DO 560 IROW=IRS,NXBT                                              FORCES  00320
C                                                                       FORCES  00321
C         TRANSFER BOX CODES TO CORRECT ARRAYS FOR NEW ROW               FORCES  00322
      NBXF = NBX                                                        FORCES  00323
      NBX  = NBXA                                                       FORCES  00324
      IF (NBXF .EQ. 0) GO TO 315                                        FORCES  00325
      DO 310 JCOL = 1,NBXF                                              FORCES  00326
  310 IBXCDF(JCOL) = IBXCD(JCOL)                                        FORCES  00327
  315 CONTINUE                                                          FORCES  00328
      IF (NBX .EQ. 0) GO TO 325                                         FORCES  00329
      DO 320 JCOL = 1,NBX                                               FORCES  00330
  320 IBXCD(JCOL)  = IBXCDA(JCOL)                                       FORCES  00331
  325 CONTINUE                                                          FORCES  00332
      IF (IROW .EQ. NXBT) GO TO 335                                     FORCES  00333
      ISROWA = ISROWA + 1                                               FORCES  00334
      IF(NP.EQ.2) GO TO 330                                             FORCES  00335
      NBXA =IPNTRM(1,ISROWA+1)-IPNTRM(1,ISROWA)+IPNTRM(2,ISROWA)-1      FORCES  00336
      CALL DCODER(IBOXW,150,ISROWA,1,ISROWA,NBXA,.F.,IBXCDA)            FORCES  00337
      GO TO 340                                                         FORCES  00338
  330 CONTINUE                                                          FORCES  00339
      IDEX = ISROWA + IOVLAP                                            FORCES  00340
      NBXA = IPNTRM(1,IDEX+1) - IPNTRM(1,IDEX) + IPNTRM(2,IDEX) - 1     FORCES  00341
      ISUBT = 2-IXBST                                                   FORCES  00342
      CALL DCODER(IBOXT(ISUBT,1),LBXCDT,ISROWA,1,ISROWA,NBXA,.F.,IBXCDA) FORCES  00343
      GO TO 340                                                         FORCES  00344
  335 CONTINUE                                                          FORCES  00345
      NBXA = 0                                                          FORCES  00346
  340 CONTINUE                                                          FORCES  00347
C                                                                       FORCES  00348
      ITROW = IROW                                                      FORCES  00349
      IF(NP.EQ.2) ITROW = IROW -IOVLAP                                  FORCES  00350
C                                                                       FORCES  00351
C         LOOP ON CHORDS OF THE BOX PATTERN                             FORCES  00352
      IF (NBX .EQ. 0) GO TO 560                                         FORCES  00353
      DO 550 JCOL = 1,NBX                                               FORCES  00354
C                                                                       FORCES  00355
      IF (IBXCD(JCOL) .NE. 1) GO TO 550                                 FORCES  00356
      IDC = LOCSDW(IROW,JCOL, IPNTRM,LPNTRM,1,LPNTRM)                   FORCES  00357
      IF (IDC .EQ. 0) GO TO 970                                         FORCES  00358
C                                                                       FORCES  00359
C         GET THE SUBSCRIPT TO USE IN THE EDGE ARRAYS, JJ               FORCES  00360
      JJ = JCOL                                                         FORCES  00361
      IF (NP .EQ. 2) GO TO 350                                          FORCES  00362
      IF ( .NOT. COPLAN) GO TO 355                                      FORCES  00363
      IF (JJ .GT. MYBT) GO TO 355                                       FORCES  00364
      IF (YEXLOC(JJ) .GE. FLOAT(ITROW) ) GO TO 355                      FORCES  00365
  350 JJ = JJ + MYBW                                                    FORCES  00366
  355 CONTINUE                                                          FORCES  00367
C                                                                       FORCES  00368
```

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C         DETERMINE BOX LEADING EDGE VALUES                                    FORCES  00369
      IF (FEXLOC(JJ) .GT. FLOAT(ITROW-1) ) GO TO 410                           FORCES  00370
C         BOX LEADING EDGE IS INTERNAL TO THE PLANFORM                         FORCES  00371
      VPLE = VPTE(JCOL)                                                        FORCES  00372
      DEFLLE = DEFLTE(JCOL)                                                    FORCES  00373
      GO TO 440                                                                FORCES  00374
C         BOX IS ON PLANFORM LEADING EDGE. IS IT INFLUENCED BY THE WAKE-       FORCES  00375
  410 CONTINUE                                                                 FORCES  00376
      IF ( JJ .EQ. JCOL .OR. .NOT. COPLAN) GO TO 420                           FORCES  00377
C                                                                              FORCES  00378
C         LEADING EDGE OF SECOND PLANFORM.  VELOCITY POTENTIAL                 FORCES  00379
C         COMPUTED FROM WAKE EQUATION.                                         FORCES  00380
      XDKVL = (FEXLOC(JJ) - TEXLOC(JCOL)) * XKVL                               FORCES  00381
      VPLE =  TVP(JCOL) * CMPLX(COS(XDKVL),-SIN(XDKVL))                        FORCES  00382
      GO TO 425                                                                FORCES  00383
C                                                                              FORCES  00384
C         LEADING EDGE OF SECOND PLANFORM OF SPATIAL ANALYSIS                  FORCES  00385
C         OR LEADING EDGE OF FIRST PLANFORM (WING)                             FORCES  00386
  420 CONTINUE                                                                 FORCES  00387
      VPLE = (0.,0.)                                                           FORCES  00388
  425 CONTINUE                                                                 FORCES  00389
C         TEST FOR SINGLE BOX                                                  FORCES  00390
      IF (TEXLOC(JJ) .LT. FLOAT(ITROW+1) ) GO TO 430                           FORCES  00391
C         BOX IS A SIMPLE LEADING EDGE BOX                                     FORCES  00392
      IDA = LOCSDW(IROW+1,JCOL, IPNTRM,LPNTRM,1,LPNTRM)                        FORCES  00393
      IF (IDA .EQ. 0) GO TO 970                                                FORCES  00394
      SLOPE = B1*DEFSL(2,IDC)                                                  FORCES  00395
      XDIF = FLOAT(ITROW) - FEXLOC(JJ)                                         FORCES  00396
      DEFLLE = DEFSL(1,IDC) - SLOPE * XDIF                                     FORCES  00397
      GO TO 450                                                                FORCES  00398
C                                                                              FORCES  00399
C         SINGLE BOX.  GET LEADING AND TRAILING VALUES                         FORCES  00400
  430 CONTINUE                                                                 FORCES  00401
      SLOPE = B1* DEFSL(2,IDC)                                                 FORCES  00402
      DEFFLE = DEFSL(1,IDC) - SLOPE * (FLOAT(ITROW) - FEXLOC(JJ))              FORCES  00403
      VPTE(JCOL) = TVP(JJ)                                                     FORCES  00404
      DEFLTE(JCOL) = DEFSL(1,IDC) + SLOPE * (TEXLOC(JJ) - FLOAT(ITROW))        FORCES  00405
      GO TO 500                                                                FORCES  00406
C                                                                              FORCES  00407
C         DETERMINE BOX TRAILING EDGE VALUES                                   FORCES  00408
  440 CONTINUE                                                                 FORCES  00409
      IF (TEXLOC(JJ) .LT. FLOAT(ITROW+1) ) GO TO 460                           FORCES  00410
C                                                                              FORCES  00411
C         BOX TRAILING EDGE IS INTERNAL TO THE PLANFORM                        FORCES  00412
      IDA = LOCSDW(IROW+1,JCOL, IPNTRM,LPNTRM, 1, LPNTRM)                      FORCES  00413
  450 CONTINUE                                                                 FORCES  00414
      VPTE(JCOL) = .5 * (DELPHI(IDC) + DELPHI(IDA))                            FORCES  00415
      DEFLTE(JCOL) = 0.5*(DEFSL(1,IDC) + DEFSL(1,IDA))                         FORCES  00416
      GO TO 500                                                                FORCES  00417
C                                                                              FORCES  00418
C         BOX IS ON SURFACE TRAILING EDGE                                      FORCES  00419
  460 CONTINUE                                                                 FORCES  00420
      VPTE(JCOL) = TVP(JJ)                                                     FORCES  00421
      SLOPE = B1*DEFSL(2,IDC)                                                  FORCES  00422
      DEFLTE(JCOL) = DEFSL(1,IDC) + SLOPE * (TEXLOC(JJ) - FLOAT(ITROW))        FORCES  00423
                                                                               FORCES  00424
C                                                                              FORCES  00425
C         BOX LEADING AND TRAILING EDGE VALUES ARE COMPUTED.  GET
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C         ALPHA, THE AREA MULTIPLIER                                    FORCES  00426
  500 CONTINUE                                                          FORCES  00427
      IF(NP.EQ.2) GO TO 505                                             FORCES  00428
      NAS = 1                                                           FORCES  00429
      NAL = NALPHW                                                      FORCES  00430
      GO TO 506                                                         FORCES  00431
C                                                                       FORCES  00432
  505 CONTINUE                                                          FORCES  00433
      NAS = NALPHW + 1                                                  FORCES  00434
      NAL = NALPH                                                       FORCES  00435
  506 CONTINUE                                                          FORCES  00436
C                                                                       FORCES  00437
      ALPH = 1.0                                                        FORCES  00438
      JCOMP = JCOL*512                                                  FORCES  00439
      JCOMP1 = JCOMP+512                                                FORCES  00440
      DO 510 I=NAS,NAL                                                  FORCES  00441
      IF (IJALPH(I) .LT. JCOMP) GO TO 510                               FORCES  00442
      IF (IJALPH(I) .GT. JCOMP1   ) GO TO 520                           FORCES  00443
      IF (IJALPH(I) .NE. JCOMP+ITROW) GO TO 510                         FORCES  00444
      ALPH = ALPHA(I)                                                   FORCES  00445
      GO TO 520                                                         FORCES  00446
  510 CONTINUE                                                          FORCES  00447
  520 CONTINUE                                                          FORCES  00448
      IF(PLYWOOD) ALPH = 1.0                                            FORCES  00449
C                                                                       FORCES  00450
C         COMPUTE TEMP1 = K1*ALPHA*(I)*(DELTA PHI)                      FORCES  00451
      TEMP1 = CMPLX(-AIMAG(DELPHI(IDC)), REAL(DELPHI(IDC)) )            FORCES  00452
      TEMP1 = TEMP1 * (XKVL*ALPH)                                       FORCES  00453
C                                                                       FORCES  00454
      IF(NM.NE.1) GO TO 530                                             FORCES  00455
C         ARE BOX LIFTS DESIRED -                                       FORCES  00456
      IF (.NOT. BLNEED) GO TO 530                                       FORCES  00457
      BXLIFT(IDC) = (TEMP1 + ALPH*(VPTE(JCOL)-VPLE))*TWOBET* TSLFN(IDC) FORCES  00458
      DELCP(IDC) = BXLIFT(IDC)/(ALPH*B1)                                FORCES  00459
  530 CONTINUE                                                          FORCES  00460
C                                                                       FORCES  00461
      TEMP2 = DEFLTE(JCOL)*VPTE(JCOL) - DEFLLE* VPLE                    FORCES  00462
      TEMP3 = (B1*ALPH*DEFSL(2,IDC)) * DELPHI(IDC)                      FORCES  00463
      GAF = (TEMP1*DEFSL(1,IDC) + TEMP2 - TEMP3) * TSLFN(IDC)           BCSFRB  00018
      AFROW(JVP) = AFROW(JVP) + GAF                                     BCSFRB  00019
C                                                                       BCSFRB  00020
      SECMOM(JJ) = SECMOM(JJ) + GAF                                     BCSFRB  00021
C                                                                       BCSFRB  00022
C                                                                       FORCES  00466
  590 CONTINUE                                                          FORCES  00467
C         END OF LOOP ON CHORDS OF THE BOX PATTERN,  FROM 340*          FORCES  00468
  580 CONTINUE                                                          FORCES  00469
C         END OF LOOP ON ROWS OF THE BOX PATTERN,  FROM 270*            FORCES  00470
C                                                                       FORCES  00471
  565 CONTINUE                                                          FORCES  00472
C         END OF LOOP ON NUMBER OF PLANFORMS                            FORCES  00473
C                                                                       FORCES  00474
C              SET UP TO WRITE RESULTS ON TAPE                          FORCES  00475
      CALL RDINIT                                                       FORCES  00476
      ITYPE = 7HCOMPLEX                                                 FORCES  00477
      PARM(1) = XKVL                                                    FORCES  00478
      PARM(2) = B1                                                      FORCES  00479
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      PARM(3) = XMACH                                                    FORCES  00480
                                                                         FORCES  00481
C                                                                        FORCES  00482
C        IF THIS IS THE FIRST WEIGHTING FUNCTION, IT MAY BE NECESSARY    FORCES  00483
C        TO WRITE AND/OR PRINT BOX LIFTS, ETC                            FORCES  00484
      IF (.NOT. BLNEED) GO TO 600                                        FORCES  00485
      IF(NM.NE.1) GO TO 600                                              FORCES  00486
C                                                                        FORCES  00487
      IF (.NOT. PRBL) GO TO 570                                          FORCES  00488
C        PRINT BOX LIFTS                                                 FORCES  00489
      TITL(1) = 8H    WING                                               FORCES  00490
      TITL(2) = 10HBOX LIFTS                                             FORCES  00491
      TITL(3) = 2H                                                       FORCES  00492
      IF(COPLAN) TITL(1) = 10HWING/TAIL                                  FORCES  00493
      CALL PRNTBL(TITL,JVP,BXLIFT,1,NROWS,MYBW,IPNTRM)                   FORCES  00494
      IF(NSURF.EQ.1 .OR. COPLAN) GO TO 570                               FORCES  00495
      TITL(1) = 8H    TAIL                                               FORCES  00496
      CALL PRNTBL(TITL,JVP,BXLIFT,IXBUT,MXBT,MYBT,IPNTRM(1,IOVLAP+1) )   FORCES  00497
  570 CONTINUE                                                           FORCES  00498
C                                                                        FORCES  00499
      IF (.NOT.PRDCP) GO TO 572                                          FORCES  00500
C                                                                        FORCES  00501
C        PRINT PRESSURE DIFFERENTIAL                                     FORCES  00502
      TITL(1) =  8H    WING                                              FORCES  00503
      TITL(2) = 10HPRESS.  DI                                            FORCES  00504
      TITL(3) = 10HFFERENCE                                              FORCES  00505
      IF(COPLAN) TITL(1) = 10HWING/TAIL                                  FORCES  00506
      CALL PRNTBL(TITL,JVP,DELCP,1,NROWS, MYBW,IPNTRM)                   FORCES  00507
      IF (NSURF.EQ.1 .OR. COPLAN) GO TO 572                              FORCES  00508
      TITL(1) = 8H    TAIL                                               FORCES  00509
      CALL PRNTBL(TITL,JVP,DELCP,IXBUT,MXBT,MYBT,IPNTRM(1,IOVLAP+1) )    FORCES  00510
  572 CONTINUE                                                           FORCES  00511
C                                                                        FORCES  00512
      IF(.NOT. (WTBL.OR.PRSL)) GO TO 600                                 FORCES  00513
C                                                                        FORCES  00514
C*****************************************************************     FORCES  00515
C        EXPAND BOX LIFTS FOR WRITING ON TAPE. WRTETP FORMAT ONLY        FORCES  00516
      IF (NXWRIT) WRITE (NT6,9999)                                       FORCES  00517
C        INITIALIZE COUNTERS FOR PASSING OVER ARRAY BACKWARDS            FORCES  00518
C             IJKL  = CURRENT LOCATION IN INPUT (COMPRESSED) ARRAY       FORCES  00519
C             IJ    = CURRENT LOCATION IN OUTPUT (EXPANDED) ARRAY        FORCES  00520
C             IJFST = FIRST LOCATION FOR CURRENT ROW IN INPUT ARRAY      FORCES  00521
C             IJPRV = FIRST LOCATION FOR PREVIOUS ROW IN INPUT ARRAY     FORCES  00522
C                                                                        FORCES  00523
      IROW  = NXB                                                        FORCES  00524
      IJFST = IPNTRM(1,NXB)                                              FORCES  00525
      LOCFST = IPNTRM(2,NXB)                                             FORCES  00526
      IJPRV = IPNTRM(1,NXB+1)                                            FORCES  00527
      IJKL  = IJPRV                                                      FORCES  00528
      IJ    = NBOXES - NYB + IJPRV-IJFST + LOCFST                        FORCES  00529
      DO 575 I = 1,NBOXES                                                FORCES  00530
      RNBF(I) = (0.,0.)                                                  FORCES  00531
  575 CONTINUE                                                           FORCES  00532
C                                                                        FORCES  00533
C        LOOP BACK HERE ON ROWS,  AND ON CHORDS WITHIN A ROW             FORCES  00534
  580 CONTINUE                                                           FORCES  00535
      IJ = IJ - 1                                                        FORCES  00536
      IJKL = IJKL - 1
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      BL = BXLIFT(IJKL)                                                 FORCES  00537
      BXLIFT(IJKL) = (0.,0.)                                            FORCES  00538
      RWBF(IJ)= BL                                                      FORCES  00539
      IF (IJKL .GT. IJFST) GO TO 580                                    FORCES  00540
C         END OF LOOP ON CHORDS WITHIN ONE ROW.  STEP TO NEXT ROW       FORCES  00541
      IJPRV = IJFST                                                     FORCES  00542
      LOCPV = LOCFST                                                    FORCES  00543
C         LOOP BACK HERE ON EMPTY ROWS (COPLANAR CASE)                  FORCES  00544
  582 CONTINUE                                                          FORCES  00545
      IROW = IROW - 1                                                   FORCES  00546
      IJ = IJ - MYB                                                     FORCES  00547
C         DETERMINE WHETHER DONE -                                      FORCES  00548
      IF (IROW .EQ. 0) GO TO 584                                        FORCES  00549
C         IS THE ROW EMPTY -                                            FORCES  00550
      IF (IPNTRM(1,IROW) .EQ. IJPRV) GO TO 582                          FORCES  00551
      IJFST  = IPNTRM(1,IROW)                                           FORCES  00552
      LOCFST = IPNTRM(2,IROW)                                           FORCES  00553
      IJ  = IJ - LOCPV  + IJPRV-IJFST + LOCFST                          FORCES  00554
      GO TO 580                                                         FORCES  00555
C           END OF LOOP ON ROWS.                                        FORCES  00556
C*****************************************************************    FORCES  00557
C                                                                       FORCES  00558
  584 CONTINUE                                                          FORCES  00559
C         ARE THE SECTION LIFTS TO BE PRINTED OR WRITTEN -              FORCES  00560
      IF(.NOT. PRSL) GO TO 595                                          FORCES  00561
C         COMPUTE SECTION LIFTS                                         FORCES  00562
      TLIFT = (0.,0.)                                                   FORCES  00563
      TLIFT1 = (0.,0.)                                                  FORCES  00564
      TLIFT2 = (0.,0.)                                                  FORCES  00565
      DO 590 JCOL = 1,MYB                                               FORCES  00566
      BL = (0.,0.)                                                      FORCES  00567
      BL2 = (0.,0.)                                                     FORCES  00568
      IROW = 0                                                          FORCES  00569
      DO 587 IJ = JCOL,NBOXES,MYB                                       FORCES  00570
      IROW = IROW + 1                                                   FORCES  00571
      IF(IROW.GT.TEXLOC(JCOL))  GO TO 586                               FORCES  00572
      BL = BL + RWBF(IJ)                                                FORCES  00573
      GO TO 587                                                         FORCES  00574
  586 BL2 = BL2 + RWBF(IJ)                                              FORCES  00575
  587 CONTINUE                                                          FORCES  00576
      TLIFT1 = TLIFT1 + BL                                              FORCES  00577
      TLIFT2 = TLIFT2 + BL2                                             FORCES  00578
      SLIFT(JCOL+MYBW) = BL2                                            FORCES  00579
      SLIFT(JCOL) = BL                                                  FORCES  00580
  590 CONTINUE                                                          FORCES  00581
C                                                                       FORCES  00582
      IF (.NOT. PRSL ) GO TO 595                                        FORCES  00583
C         PRINT SECTION LIFTS AND TOTAL LIFT                            FORCES  00584
      CALL PRNTSL(JVP,SLIFT,TLIFT1,TLIFT2,MYBW,MYBT )                   FORCES  00585
C                                                                       FORCES  00586
  595 CONTINUE                                                          FORCES  00587
      IF(.NOT.PRCM) GO TO 599                                           BCSFRB  00023
      DO 596 I=1,NTVPS                                                  BCSFRB  00024
      SECMOM(I) = SECMOM(I) * TWOBET                                    BCSFRB  00025
  596 CONTINUE                                                          BCSFRB  00026
      NCM = -JVP                                                        BCSFRB  00027
      CALL PRNTSL(NCM,SECMOM,TLIFT1,TLIFT2,MYBW,MYBT)                   BCSFRB  00028
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C                                                                       BC3FRB  00029
  599 CONTINUE                                                          BC3FRB  00030
      IF (.NOT. WTEL) GO TO 600                                         FORCES  00588
C         WRITE BOX LIFTS ONTO THE BINARY OUTPUT FILE                   FORCES  00589
      ITYPE = 7HCOMPLEX                                                 FORCES  00590
      M = MXB                                                           FORCES  00591
      K = - M                                                           FORCES  00592
      N = MYB                                                           FORCES  00593
      MXARRY = 7HBXLIFTS                                                FORCES  00594
      ID(2) = 1000000*IKVAL + JVP                                       FORCES  00595
      CALL WRTEMX( NOUTP, MXWRIT,RANDOU, NFS, NMS,LS, NMR,LWS, K, ID,   FORCES  00596
     1             RWBF,ITYPE, M, N, FARM, IRR )                      FORCES  00597
      IF (IRR .NE. 0) GO TO 922                                         FORCES  00598
C                                                                       FORCES  00599
  600 CONTINUE                                                          FORCES  00600
C         END OF LOOP ON VELOCITY POTENTIALS                            FORCES  00601
C                                                                       FORCES  00602
C         STORE THE ROW OF GENERALIZED AIRFORCES INTO THE FULL MATRIX   FORCES  00603
      IJ = NM                                                           FORCES  00604
      DO 620 JVP = 1,NVPS                                               FORCES  00605
      GENAF(IJ) = AFROW(JVP)*TWOBET                                     FORCES  00606
      GPAFC(IJ) = BS3BET * REAL(GENAF(IJ))                              FORCES  00607
      GPPAFC(IJ) = 0.                                                   FORCES  00608
      IF(XKVL.NE.0.) GPPAFC(IJ) = BKS4BT * AIMAG(GENAF(IJ))             FORCES  00609
      IJ = IJ + NMODES                                                  FORCES  00610
  620 CONTINUE                                                          FORCES  00611
  650 CONTINUE                                                          FORCES  00612
C                                                                       FORCES  00613
C                                                                       FORCES  00614
      IF(.NOT.WTGNAF) GO TO 670                                         FORCES  00615
      K = NMODES                                                        FORCES  00616
      M = NMODES                                                        FORCES  00617
      N = NMODES                                                        FORCES  00618
      ID(2) = IKVAL                                                     FORCES  00619
      CALL WRTEMX( NOUTP, MXWRIT,RANDOU, NFS,NMS,LS, NMR,LWS, K, ID,    FORCES  00620
     1    GENAF,   ITYPE, M,N, FARM, IRR)                               FORCES  00621
      IF (IRR .NE. 0) GO TO 928                                         FORCES  00622
C                                                                       FORCES  00623
C         ARE THE FORCES TO BE PRINTED -                                FORCES  00624
  670 CONTINUE                                                          FORCES  00625
      IF (.NOT. PRGNAF) GO TO 700                                       FORCES  00626
C                                                                       FORCES  00627
      CALL PRNTAF(GENAF,PRGNAC,GPAFC,GPPAFC)                            FORCES  00628
  700 CONTINUE                                                          FORCES  00629
C                                                                       FORCES  00630
      REWIND MODESC                                                     FORCES  00631
      NMSPCE = 1                                                        FORCES  00632
  750 CONTINUE                                                          FORCES  00633
C                                                                       FORCES  00634
      RETURN                                                            FORCES  00635
C                                                                       FORCES  00636
C         DIAGNOSTICS - ALL CALL FLUSH                                  FORCES  00637
C                                                                       FORCES  00638
C               READING FROM SCRATCH FILE                               FORCES  00639
 9010 CONTINUE                                                          FORCES  00640
      WRITE (NT6,9100) IGEOSC                                           FORCES  00641
      GO TO 950                                                         FORCES  00642
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 6020 CONTINUE                                                          FORCES  00643
      WRITE (NT6,9120) MODESC                                           FORCES  00644
      GO TO 950                                                         FORCES  00645
 6030 CONTINUE                                                          FORCES  00646
      WRITE (NT6,9180) IVPSC                                            FORCES  00647
      GO TO 950                                                         FORCES  00648
C                                                                       FORCES  00649
 6040 CONTINUE                                                          FORCES  00650
      WRITE (NT6,9140) ITSLSC                                           FORCES  00651
      GO TO 950                                                         FORCES  00652
C                                                                       FORCES  00653
C             WRITING ON THE OUTPUT TAPE                                FORCES  00654
  922 CONTINUE                                                          FORCES  00655
      WRITE (NT6,9220) NOUTP                                            FORCES  00656
      GO TO 952                                                         FORCES  00657
  928 CONTINUE                                                          FORCES  00658
      WRITE (NT6,9280) NOUTP                                            FORCES  00659
      GO TO 952                                                         FORCES  00660
C             INCORRECT DIMENSIONS READ                                 FORCES  00661
  930 CONTINUE                                                          FORCES  00662
      I = 1                                                             FORCES  00663
      GO TO 932                                                         FORCES  00664
  931 I = 2                                                             FORCES  00665
  932 WRITE (NT6,9300) I                                                FORCES  00666
      IF(MXREAD) GO TO 960                                              FORCES  00667
      GO TO 962                                                         FORCES  00668
C             ERROR DETECTED READING A MATRIX                           FORCES  00669
  950 CONTINUE                                                          FORCES  00670
      WRITE (NT6,9500) IRR                                              FORCES  00671
      IF(MXREAD) GO TO 960                                              FORCES  00672
      GO TO 962                                                         FORCES  00673
C             ERROR DETECTED WRITING A MATRIX                           FORCES  00674
  952 CONTINUE                                                          FORCES  00675
      WRITE (NT6,9520) IRR                                              FORCES  00676
      IF(MXWRIT) GO TO 960                                              FORCES  00677
      GO TO 962                                                         FORCES  00678
C             MATRIX DESCRIPTION                                        FORCES  00679
  960 CONTINUE                                                          FORCES  00680
      WRITE (NT6,9600) (ID(I),I=1,10),(ID(I),I=1,10)                    FORCES  00681
      WRITE (NT6,9622)  FARM,FARM                                       FORCES  00682
      WRITE (NT6,9614)  NMR,NMR,LRS,LMS                                 FORCES  00683
      GO TO 964                                                         FORCES  00684
  962 WRITE (NT6,9620) ID(1),ID(2)                                      FORCES  00685
      WRITE (NT6,9622)  FARM,FARM                                       FORCES  00686
      WRITE (NT6,9624)  NFS,NMS                                         FORCES  00687
  964 WRITE (NT6,9640) ITYPE,M,N                                        FORCES  00688
      WRITE (NT6,9650) MXARRY                                           FORCES  00689
      GO TO 990                                                         FORCES  00690
  970 CONTINUE                                                          FORCES  00691
      WRITE (NT6,9700) IROW, JCOL                                       FORCES  00692
      GO TO 990                                                         FORCES  00693
C                                                                       FORCES  00694
  990 CONTINUE                                                          FORCES  00695
      WRITE (NT6,9900)                                                  FORCES  00696
C                                                                       FORCES  00697
      CALL FLUSH(1)                                                     FORCES  00698
C                                                                       FORCES  00699
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C               DIAGNOSTIC FORMATS                                      FORCES  00700
 9100 FORMAT(47HO*** ERROR WHILE READING GEOMETRY SCRATCH FILE ,A10,     FORCES  00701
     1   4H *** )                                                       FORCES  00702
 9120 FORMAT(44HO*** ERROR WHILE READING MODES SCRATCH FILE ,A10,        FORCES  00703
     1   4H *** )                                                       FORCES  00704
 9140 FORMAT(54HO*** ERROR WHILE READING THICKNESS SLOPE SCRATCH FILE    FORCES  00705
     1   A10, 4H *** )                                                  FORCES  00706
 9180 FORMAT(51HO*** ERROR WHILE READING VELOCITY POTENTIAL SCRATCH      FORCES  00707
     1   6H FILE ,A10,4H *** )                                          FORCES  00708
      DATA XINOFF  /2* 6000000000020037777778 /                         FTNX1   00082
 9220 FORMAT(49HO*** ERROR WHILE WRITING BOX LIFTS ON OUTPUT TAPE,I2,    FORCES  00711
     1   4H *** )                                                       FORCES  00712
 9260 FORMAT(56HO*** ERROR WHILE WRITING GENERALIZED AIRFORCES ON OUTPUT FORCES  00713
     1   5H TAPE,I2,4H *** )                                            FORCES  00714
 9300 FORMAT(1HO,   48H*** MATRIX READ ERROR.  THE  M  DIMENSION SHOULD FORCES  00715
     1   4H BE ,I2, 4H ***)                                             FORCES  00716
 9500 FORMAT(16HO *** ERROR CODE ,I5, 28H WHILE READING THE FOLLOWING    FORCES  00717
     1  11H MATRIX *** )                                               FORCES  00718
 9520 FORMAT(16HO *** ERROR CODE ,I5, 28H WHILE WRITING THE FOLLOWING    FORCES  00719
     1  11H MATRIX *** )                                               FORCES  00720
 9600 FORMAT( 5X,*MATRIX ID = *, 10A10 / (20X,10A10) )                  FTNX1   00083
 9614 FORMAT( 5X,22HMATRIX INDEX (NAME) = ,I5,2H (A10,1H) /             FORCES  00722
     1         5X,33HLEVEL NUMBER READ (OR WRITTEN) = O2,3H, (,O2,1H) ) FTNX1   00084
 9620 FORMAT( 5X,*MATRIX ID = *, A10, I10 )                             FORCES  00724
 9622 FORMAT( 5X,11HPARAMETERS, 10E11.3 /10X, 9H(INTEGER), I7,9I11)     FORCES  00725
 9624 FORMAT( 5X,15HFILE SPACING = ,I3, 19H, MATRIX SPACING = ,I3 )     FORCES  00726
 9640 FORMAT( 5X,*MATRIX TYPE - *,I10, *, DIMENSIONED (*I4,* X*,I4,*)*) FORCES  00727
 9650 FORMAT( 5X,*ARRAY - *, A10)                                       FORCES  00728
 9700 FORMAT(37HO*** POINTER ARRAY EXCEEDED FOR BOX (,I4,1H,I4,5H) ***) FORCES  00729
 9900 FORMAT(48HO*** ERROR OCCURRED DURING GENERALIZED AIRFORCES        FORCES  00730
     1       17H CALCULATIONS *** )                                     FORCES  00731
 9999 FORMAT(54HO*** W A R N I N G  -  BOX LIFTS CANNOT BE WRITTEN IN   FORCES  00732
     1    16HSNARK FORMAT *** )                                         FORCES  00733
C                                                                       FORCES  00734
      END                                                               FORCES  00735
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      SUBROUTINE DCODER(IBOX,LBOX, IA,JA,  IL,JL,  SUBD, ICODE)          DCODAF  00002
      DIMENSION  IBOX(LBOX,1), ICODE(1)                                  DCODAF  00003
C                                                                        DCODAF  00004
C         IBOX   - ARRAY OF BOX CODES IN PACKED WORD FORMAT              DCODAF  00005
C         LBOX   - ROW DIMENSION OF BOX CODES ARRAY                      DCODAF  00006
C         IA     - I-TH INDEX OF FIRST CODE TO RETRIEVE                  DCODAF  00007
C         JA     - J-TH INDEX OF FIRST CODE TO RETRIEVE                  DCODAF  00008
C         IL     -  LAST BOX CODE ON THE JA-TH CHORD TO RETRIEVE         DCODAF  00009
C         JL     -  LAST BOX ON THE IA-TH ROW TO RETRIEVE                DCODAF  00010
C         SUBD   - .T., SUBDIVIDED BOX CODES DESIRED, .F. UNSUBDIVIDED.  DCODAF  00011
C         ICODE  - ARRAY INTO WHICH BOX CODE WILL BE STORED.             DCODAF  00012
C                                                                        DCODAF  00013
C         COMMENT ON USAGE                                               DCODAF  00014
C            BOX CODES CAN BE RETRIEVED FOR ONE BOX, A ROW OR PART OF    DCODAF  00015
C         A ROW, OR A COLUMN OR PART OF A COLUMN. A ROW AND COLUMN CAN   DCODAF  00016
C         NOT BE RETRIEVED AT THE SAME TIME. IF ONLY 1 BOX IS DESIRED    DCODAF  00017
C         SET  IL = IA AND  JL = JA.   IF BOTH  IL .NE. IA AND  JL .NE.  DCODAF  00018
C         JA, ONE ROW WILL BE RETURNED,  IL BEING IGNORED.               DCODAF  00019
C                                                                        DCODAF  00020
      COMMON /GEOMTY/ COPLAN,NSUBDV,XSUBDV,NSUBD2,NSUBCN,NSURF,          GEOMTY  00002
     1                B1,B1BETA,B1S,B1BTAS,WLAX,WLAZ,PSIW,              GEOMTY  00003
     2                MXBW,MXBBW,MYBW,MYBBW,MXBSW,MYBSW,MYBBSW,         GEOMTY  00004
     3                IXBW,XCENTR                                       GEOMTY  00005
      LOGICAL COPLAN                                                     GEOMTY  00006
      LOGICAL SUBD                                                       DCODAF  00022
      INTEGER SHIFT                                                      DCODAF  00023
      DATA NBWRD /20/                                                    DCODAF  00024
      MASK = 7                                                           DCODAF  00025
      IB = 1                                                             DCODAF  00026
      IF (SUBD) GO TO 50                                                 DCODAF  00027
      I = NSUBDV * (IA-1) + IXBW                                         DCODAF  00028
      J = NSUBDV * (JA-1) + NSUBCN                                       DCODAF  00029
      ISKIP = NSUBDV                                                     DCODAF  00030
      IEND = NSUBDV * (IL-1) + IXBW                                      DCODAF  00031
      JEND = NSUBDV * (JL-1) + NSUBCN                                    DCODAF  00032
      GO TO 60                                                           DCODAF  00033
   50 CONTINUE                                                           DCODAF  00034
      I = IA                                                             DCODAF  00035
      J = JA                                                             DCODAF  00036
      ISKIP = 1                                                          DCODAF  00037
      IEND = IL                                                          DCODAF  00038
      JEND = JL                                                          DCODAF  00039
   60 CONTINUE                                                           DCODAF  00040
      IF (JL  .EQ. JA) GO TO 1100                                        DCODAF  00041
C                                                                        DCODAF  00042
C         PROGRAM WILL RETRIEVE NI BOXES FROM ROW I                      DCODAF  00043
  100 CONTINUE                                                           DCODAF  00044
      DO 1000 JJ = J,JEND,ISKIP                                          DCODAF  00045
      JSB =(JJ-1)/NBWRD + 1                                              DCODAF  00046
      IJWORD = IBOX(I,JSB)                                               DCODAF  00047
      JB = (NBWRD - MOD(JJ,NBWRD) ) * 3                                  DCODAF  00048
      IF(JB.EQ.60) JB = 0                                                DCODAF  00049
C         JB = NUMBER OF BITS TO SHIFT LEFT.                             DCODAF  00050
      IJMASK= SHIFT(MASK,JB)                                             DCODAF  00051
      IJCODE =  IJWORD.AND.IJMASK                                        DCODAF  00052
      NJB = -JB                                                          DCODAF  00053
      ICODE(IB) = SHIFT(IJCODE,NJB)                                      DCODAF  00054
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      IB = IB + 1                                                    DCODAF  00055
 1000 CONTINUE                                                       DCODAF  00056
      GO TO 3000                                                     DCODAF  00057
C                                                                    DCODAF  00058
C         PROGRAM WILL RETRIEVE NU BOXES FROM CHORD J                DCODAF  00059
 1100 CONTINUE                                                       DCODAF  00060
      JSB  = (J-1)/NBWRD + 1                                         DCODAF  00061
      JB = (NBWRD - MOD(J,NBWRD) ) * 3                               DCODAF  00062
      IF(JB.EQ.60) JB = 0                                            DCODAF  00063
      IJMASK = SHIFT(MASK,JB)                                        DCODAF  00064
      NUB = -JB                                                      DCODAF  00065
      DO 2000 II = I,IEND,ISKIP                                      DCODAF  00066
      IJWORD = IBOX(II,JSB)                                          DCODAF  00067
      IJCODE = IJWORD.AND.IJMASK                                     DCODAF  00068
      ICODE(IB) = SHIFT(IJCODE,NUB)                                  DCODAF  00069
      IB = IB + 1                                                    DCODAF  00070
 2000 CONTINUE                                                       DCODAF  00071
C                                                                    DCODAF  00072
 3000 CONTINUE                                                       DCODAF  00073
      RETURN                                                         DCODAF  00074
      END                                                            DCODAF  00075
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      SUBROUTINE PRNTBL(TITL,IMODE,ARRAY,IXB,MXB,MYB,IPNTRM)                PRNTBL  00002
C                                                                           PRNTBL  00003
C      PRINTS BOX LIFTS,  USES /RWBUFF/ FOR INTERMEDIATE SCRATCH            PRNTBL  00004
C         IMODE  - MODE SHAPE NUMBER                                        PRNTBL  00005
C         ARRAY  - ARRAY TO BE PRINTED                                      PRNTBL  00006
C         IPNTRM - POINTER ARRAY FOR ROWS IN -ARRAY-                        PRNTBL  00007
C         NPNTRS - NUMBER OF POINTERS                                       PRNTBL  00008
C                                                                           PRNTBL  00009
      COMPLEX ARRAY(1)                                                      PRNTBL  00010
      DIMENSION  TITL(3)                                                    PRNTBL  00011
      DIMENSION IPNTRM(2,50)                                                PRNTBL  00012
C                                                                           PRNTBL  00013
      COMMON /CONTRL/ PREVEX,OMACH, TITLE(8), PRVGEOM,PRVMODE,DIHW,DIHT,    CONTRL  00002
     1                DEFAULT                                              CONTRL  00003
      LOGICAL     PRVGEOM,PRVMODE,DIHW,DIHT,DEFAULT                         CONTRL  00004
      COMMON /PROBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,ORDFIT,        PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                                  PROBLM  00003
      LOGICAL         SMOOTH,ORDFIT,EXAIC,SUBDV,PLYWOOD                     PROBLM  00004
      COMMON /KVAL  / IKVAL,XKVAL(20), XKS(20)                              KVAL    00002
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,             FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC             FILES   00003
C                                                                           PRNTBL  00019
      INTEGER PAGE                                                          PRNTBL  00020
      DIMENSION S(1),D(1)                                                   PRNTBL  00021
      EQUIVALENCE (S,BUFF),(D,BUFF(1251))                                   PRNTBL  00022
      COMPLEX TLIFT                                                         PRNTBL  00023
      COMPLEX  TLIFT1,TLIFT2                                                PRNTBL  00024
      DIMENSION PC(2), IPNT(2)                                              PRNTBL  00025
      EQUIVALENCE (IPNT,  TLIFT)                                            PRNTBL  00027
      COMMON /RWBUFF/ BFCODE,IBFCNT,  BUFF(3280)                            RWBUFF  00002
      DATA  PC / 10HPAGE CONTI,4HNUED /                                     FTN01   00086
      DATA BLANK /1H /                                                      PRNTBL  00028
      DATA  XINIT / -1.0 /                                                  PRNTBL  00029
      DATA LINEMX /50 /                                                     PRNTBL  00030
C                                                                           PRNTBL  00031
C                                                                           PRNTBL  00032
      XKVL = XKVAL(IKVAL)                                                   PRNTBL  00033
      IF(XKS(IKVAL).NE.XINIT) XKVL = XKS(IKVAL)                             PRNTBL  00034
      PAGE = 0                                                              PRNTBL  00035
      N =1                                                                  PRNTBL  00036
      M =4                                                                  PRNTBL  00037
      IF(M.GT.MYB) M = MYB                                                  PRNTBL  00038
C                                                                           PRNTBL  00039
  100 LINE = 100                                                            PRNTBL  00040
  200 DO 1400 I=IXB,MXB                                                     PRNTBL  00041
      DO 300 J=N,M                                                          PRNTBL  00042
      S(J) = 0.0                                                            PRNTBL  00043
      D(J) = 0.0                                                            PRNTBL  00044
  300 CONTINUE                                                              PRNTBL  00045
      IF(LINE.LE.50) GO TO 900                                              PRNTBL  00046
      PAGE = PAGE + 1                                                       PRNTBL  00047
      LINE = 4                                                              PRNTBL  00048
      WRITE (NT6,9001) TITLE,TITL,XMACH,XKVL,IMODE                          PRNTBL  00049
      IF(PAGE.EQ.1) GO TO 700                                               PRNTBL  00050
      WRITE(NT6,9005) PC                                                    PRNTBL  00051
      GO TO 800                                                             PRNTBL  00052
  700 WRITE(NT6,9005)                                                       PRNTBL  00053
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  800 CONTINUE                                                          PRNTBL  00054
      WRITE(NT6,6006) (BLANK,J,J=N,M)                                   PRNTBL  00055
      WRITE(NT6,6007) (BLANK,  J=N,M)                                   PRNTBL  00056
C                                                                       PRNTBL  00057
  900 CONTINUE                                                          PRNTBL  00058
      JS = IPNTRM(2,I)                                                  PRNTBL  00059
      IF(JS.LE.0) GO TO 1400                                            PRNTBL  00060
      IDX = IPNTRM(1,I)                                                 PRNTBL  00061
      JE = IPNTRM(1,I+1) - IDX  + JS-1                                  PRNTBL  00062
      IF(JE.EQ.0) GO TO 1400                                            PRNTBL  00063
      DO 1000 J=JS,JE                                                   PRNTBL  00064
      S(J) =  REAL(ARRAY(IDX))                                          PRNTBL  00065
      D(J) = AIMAG(ARRAY(IDX))                                          PRNTBL  00066
      IDX = IDX + 1                                                     PRNTBL  00067
 1000 CONTINUE                                                          PRNTBL  00068
      DO 1200 J =N,M                                                    PRNTBL  00069
      IF(S(J)) 1300,1100,1300                                           PRNTBL  00070
 1100 CONTINUE                                                          PRNTBL  00071
      IF(D(J)) 1300,1200,1300                                           PRNTBL  00072
 1200 CONTINUE                                                          PRNTBL  00073
      GO TO 1400                                                        PRNTBL  00074
 1300 WRITE(NT6,9013) I,(S(J),D(J),J=N,M)                               PRNTBL  00075
      LINE = LINE + 1                                                   PRNTBL  00076
 1400 CONTINUE                                                          PRNTBL  00077
C                                                                       PRNTBL  00078
      M = M+4                                                           PRNTBL  00079
      N = N+4                                                           PRNTBL  00080
      IF(N.GT.MYB) GO TO 1500                                           PRNTBL  00081
      IF(M.GT.MYB) M = MYB                                              PRNTBL  00082
      IF(LINE.GT.45) GO TO 100                                          PRNTBL  00083
      WRITE(NT6,6006) (BLANK,J,J=N,M)                                   PRNTBL  00084
      WRITE(NT6,6007) (BLANK,  J=N,M)                                   PRNTBL  00085
      LINE = LINE+3                                                     PRNTBL  00086
      GO TO 200                                                         PRNTBL  00087
 1500 CONTINUE                                                          PRNTBL  00088
      RETURN                                                            PRNTBL  00089
 9001 FORMAT(1H1,20X,8A10,/50X,3A10,/ 46X,7H( MACH F5.3,5X,10HRED.FREQ.  PRNTBL  00090
     1    4H=*,F8.5, * )* /52X,4HMODE  SHAPE*, I3 )                     PRNTBL  00091
 9005 FORMAT(44X,42(1H-),20X,A10,A4 )                                   PRNTBL  00092
 9006 FORMAT(4HORDW,A1,14X,5HCHORD,I3,3(A1,22X,5HCHORD,I3))             PRNTBL  00093
 9007 FORMAT(3X, 4(A1,9X,4HREAL,8X,9HIMAGINARY) )                       PRNTBL  00094
 9013 FORMAT(I4,8E16.8)                                                 PRNTBL  00095
      END                                                               PRNTBL  00096
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      SUBROUTINE PRNTSL(IMODE,SLIFT,TLIFT1,TLIFT2,MYBW,MYBT)                PRNTBL  00097
C                                                                           PRNTBL  00098
C         PRINTS THE SECTION LIFTS AND TOTAL LIFTS                          PRNTBL  00099
C                                                                           PRNTBL  00100
C         IMODE  - MODE SHAPE NUMBER                                        PRNTBL  00101
C         SLIFT  - SECTION LIFT ARRAY                                       PRNTBL  00102
C         TLIFT1 - WING TOTAL LIFT                                          PRNTBL  00103
C         TLIFT2 - TAIL TOTAL LIFT                                          PRNTBL  00104
C                                                                           BCSFRB  00031
C         IF IMODE IS NEGATIVE THE PROGRAM WILL OUTPUT SECTION MOMENTS      BCSFRB  00032
C                                                                           BCSFRB  00033
C                                                                           PRNTBL  00105
      COMMON /PROBLM/ XMACH,MMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,        PROBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                                  PROBLM  00003
      LOGICAL         SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                     PROBLM  00004
      COMMON /CONTRL/ PREVEX,OMACH, TITLE(8), PRVGEOM,PRVMODE,DIHW,DIHT,    CONTRL  00002
     1               DEFAULT                                              CONTRL  00003
      LOGICAL     PRVGEOM,PRVMODE,DIHW,DIHT,DEFAULT                       CONTRL  00004
      COMMON /KVAL  / IKVAL,XKVAL(20), XKS(20)                            KVAL    00002
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSFAIC,NOUTP,           FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC            FILES   00003
C                                                                           PRNTBL  00109
      COMPLEX  SLIFT(1)                                                   PRNTBL  00110
      COMPLEX  TLIFT1,TLIFT2,TLIFT                                        PRNTBL  00111
      LOGICAL PRCM                                                        BCSFRB  00035
      DATA    BLANK/1H /                                                  PRNTBL  00112
      DATA  XINIT / -1.0 /                                                PRNTBL  00113
C                                                                           PRNTBL  00114
      IF(IMODE.LT.0) GO TO 100                                            BCSFRB  00036
      PRCM = .FALSE.                                                      BCSFRB  00037
      GO TO 200                                                           BCSFRB  00038
  100 CONTINUE                                                            BCSFRB  00039
      PRCM = .TRUE.                                                       BCSFRB  00040
      IMODE = -IMODE                                                      BCSFRB  00041
  200 CONTINUE                                                            BCSFRB  00042
C                                                                           PRNTBL  00115
      XKVL = XKVAL(IKVAL)                                                 PRNTBL  00116
      IF(XKS(IKVAL).NE.XINIT) XKVL = XKS(IKVAL)                           PRNTBL  00117
      IF(PRCM) GO TO 300                                                  BCSFRB  00043
      WRITE (NT6,6010) XMACH,XKVL,IMODE                                   PRNTBL  00118
      GO TO 400                                                           BCSFRB  00044
  300 CONTINUE                                                            BCSFRB  00045
      WRITE (NT6,9010) XMACH,XKVL,IMODE                                   BCSFRB  00046
  400 CONTINUE                                                            BCSFRB  00047
      WRITE (NT6,6008)                                                    PRNTBL  00119
      WRITE (NT6,6005)                                                    PRNTBL  00120
      WRITE (NT6,6020)                                                    PRNTBL  00121
      WRITE (NT6,6007) BLANK,BLANK,BLANK,BLANK                            PRNTBL  00122
      DO 600 I=1,MYBW,4                                                   PRNTBL  00123
      II = I + 3                                                          PRNTBL  00124
      IF (II .GT. MYBW) II = MYBW                                         PRNTBL  00125
      WRITE (NT6,6030) I,(SLIFT(IJ),IJ=I,II)                             PRNTBL  00126
  600 CONTINUE                                                            PRNTBL  00127
      IF(PRCM) GO TO 650                                                  BCSFRB  00048
      WRITE (NT6,6023) TLIFT1                                             PRNTBL  00128
      IF(MYBT.EQ.0) GO TO 800                                             BCSFRB  00049
C                                                                         PRNTBL  00129
```

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      WRITE (NT6,6009)                                                  PRNTBL  00130
      GO TO 675                                                         BCSFRB  00050
  650 CONTINUE                                                          BCSFRB  00051
      IF(MYBT.EQ.0) GO TO 800                                           BCSFRB  00052
      WRITE(NT6,9009)                                                   BCSFRB  00053
  675 CONTINUE                                                          BCSFRB  00054
      WRITE (NT6,6020)                                                  PRNTBL  00131
      WRITE (NT6,6007) BLANK,BLANK,BLANK,BLANK                          PRNTBL  00132
      DO 700 I=1,MYBT,4                                                 PRNTBL  00133
      II = I + 3                                                        PRNTBL  00134
      IF (II .GT. MYBT) II = MYBT                                       PRNTBL  00135
      I2 = I + MYBW                                                     PRNTBL  00136
      II2 = II + MYBW                                                   PRNTBL  00137
      WRITE (NT6,6030) I,(SLIFT(IJ),IJ=I2,II2)                          PRNTBL  00138
  700 CONTINUE                                                          PRNTBL  00139
C                                                                       PRNTBL  00140
      IF(FRCH) GO TO 800                                                BCSFRB  00055
      WRITE (NT6,6024) TLIFT2                                           PRNTBL  00141
      TLIFT = TLIFT1 + TLIFT2                                           PRNTBL  00142
      WRITE (NT6,6025) TLIFT                                            PRNTBL  00143
  800 CONTINUE                                                          BCSFRB  00056
      RETURN                                                            PRNTBL  00144
C                                                                       PRNTBL  00145
C                                                                       PRNTBL  00146
 6005 FORMAT(44X,32(1H-),30X,A10,A4)                                    PRNTBL  00147
 6007 FORMAT(3X, 4(A1,9X,4HREAL,8X,9HIMAGINARY) )                       PRNTBL  00148
 6008 FORMAT(58X,*WING* )                                               PRNTBL  00149
 6009 FORMAT(1HO,// 53X,*SECTION LIFTS* / 58X,*TAIL*,/ 44X,32(1H-) / )  PRNTBL  00150
 6010 FORMAT(1HO,52X, 14HSECTION LIFTS        /44X,*( MACH *,F5.3,5X,   PRNTBL  00151
     1 *RED. FREQ. =* F8.5,* )* / 52X,*MODE   SHAPE*,I3)                PRNTBL  00152
 6020 FORMAT(6HOCHORD)                                                  PRNTBL  00153
 6023 FORMAT(1HO,44X,* TOTAL LIFT  -  WING * / 1HO 40X,2E16.8 )         PRNTBL  00154
 6024 FORMAT(1HO,44X,* TOTAL LIFT  -  TAIL * / 1HO 40X,2E16.8 )         PRNTBL  00155
 6025 FORMAT(1HO,53X,* TOTAL LIFT */ 1HO,40X,2E16.8 )                   PRNTBL  00156
 6030 FORMAT(I4,8E16.8)                                                 PRNTBL  00157
 9009 FORMAT(1HO//   45X,*SECTIONAL MOMENT COEFFICIENTS*/58X,*TAIL*/    BCSFRB  00057
     1      44X, 32(1H-) / )                                           BCSFRB  00058
 9010 FORMAT(1HO////,45X,*SECTIONAL MOMENT COEFFICIENTS*/44X,*(MACH *,   BCSFRB  00059
     1       F5.3,5X,*RED. FREQ. =* F8.5,* )* /52X,* MODE   SHAPE*,I3)  BCSFRB  00060
      END                                                               PRNTBL  00158
```

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      SUBROUTINE PRNTAF(ARRAY,PRGNAC,GPAFC,GPPAFC)                      PRNTAF  00002
C         PRINTS COMPLEX GENERALIZED AIRFORCES, FROM COMPACT FORTRAN     PRNTAF  00003
C         STORAGE                                                       PRNTAF  00004
C                                                                       PRNTAF  00005
C         ARRAY  - ARRAY OF GENERALIZED AIR FORCES                      PRNTAF  00006
C         PRGNAC - LOGICAL FLAG FOR PRINT OPTION                        PRNTAF  00007
C         GPAFC  - AGARD GENERALIZED AERODYNAMIC COEFFICIENT            PRNTAF  00008
C         GPPAFC - AGARD GENERALIZED AERODYNAMIC COEFFICIENT            PRNTAF  00009
C                                                                       PRNTAF  00010
      COMPLEX ARRAY(1)                                                  PRNTAF  00011
      DIMENSION  GPAFC(1),GPPAFC(1)                                     PRNTAF  00012
      LOGICAL    PRGNAC                                                 PRNTAF  00013
C                                                                       PRNTAF  00014
      DIMENSION PC(2)                                                   PRNTAF  00015
      COMMON /PRCBLM/ XMACH,NMODES,NTSLOP,NKVALS,SMOOTH,NDEG,CRDFIT,    PRCBLM  00002
     1                EXAIC,SUBDV,PLYWOOD                               PRCBLM  00003
      LOGICAL         SMOOTH,CRDFIT,EXAIC,SUBDV,PLYWOOD                 PRCBLM  00004
      COMMON /KVAL  / IKVAL, XKVAL(20), XKS(20)                         KVAL    00002
      COMMON /FILES / NT5,NT6,INTAPE,INFSP,NPLAIC,NSPAIC,NOUTP,         FILES   00002
     1                IOUFSP,MODESC,IVPSC,IGEOSC,IWTFSC,IAICSC          FILES   00003
      INTEGER PAGE                                                      PRNTAF  00022
      DATA   PC    / 10HPAGE CONTI,4HNUED /                             FTN001  00087
      DATA   BLANK / 1H  /                                              FTN001  00088
      DATA   XINIT / -1.0 /                                             FTN001  00089
      XKVL = XKVAL(IKVAL)                                               PRNTAF  00023
      IF(XKS(IKVAL).NE.XINIT) XKVL = XKS(IKVAL)                         PRNTAF  00024
      LINEMX = 50                                                       PRNTAF  00025
      PAGE = 0                                                          PRNTAF  00026
      J1 = 1                                                            PRNTAF  00027
      J2 = 4                                                            PRNTAF  00028
      IF (NMODES .LT. J2) J2 = NMODES                                   PRNTAF  00029
      IJ1 = 1                                                           PRNTAF  00030
      IJ2 =(J2-1)*NMODES + 1                                            PRNTAF  00031
C                                                                       PRNTAF  00032
  100 LINE = LINEMX + 10                                                PRNTAF  00033
  110 DO 200  I = 1,NMODES                                              PRNTAF  00034
      IF (LINE .LE. LINEMX) GO TO 170                                   PRNTAF  00035
      PAGE = PAGE + 1                                                   PRNTAF  00036
      LINE = 8                                                          PRNTAF  00037
      WRITE (NT6,6001) XMACH,XKVL                                       PRNTAF  00038
      IF (PAGE .EQ. 1) GO TO 150                                        PRNTAF  00039
      WRITE (NT6,6005) PC                                               PRNTAF  00040
      GO TO 160                                                         PRNTAF  00041
  150 WRITE (NT6,6005)                                                  PRNTAF  00042
  160 CONTINUE                                                          PRNTAF  00043
C                                                                       PRNTAF  00044
      WRITE (NT6,6006) (BLANK,J, J=J1,J2)                               PRNTAF  00045
      WRITE (NT6,6007)  (BLANK,   J=J1,J2)                              PRNTAF  00046
C                                                                       PRNTAF  00047
  170 CONTINUE                                                          PRNTAF  00048
      WRITE (NT6,6010)  I, (ARRAY(IJ),IJ= IJ1,IJ2,NMODES)               PRNTAF  00049
      LINE = LINE + 1                                                   PRNTAF  00050
      IJ1 = IJ1 + 1                                                     PRNTAF  00051
      IJ2 = IJ2 + 1                                                     PRNTAF  00052
  200 CONTINUE                                                          PRNTAF  00053
C                                                                       PRNTAF  00054
      J1 = J1 + 4                                                       PRNTAF  00055
```

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      J2 = J2 + 4                                                       PRNTAF  00056
      IF (J1 .GT. NMODES) GO TO 300                                     PRNTAF  00057
      IF (J2 .GT. NMODES) J2 = NMODES                                   PRNTAF  00058
      IJ1 = IJ1 + 3*NMODES                                              PRNTAF  00059
      IJ2 = IJ1 + (J2-J1) * NMODES                                      PRNTAF  00060
      IF (LINE .GT. LINEMX -6) GO TO 100                                PRNTAF  00061
      WRITE (NT6,6006)  (BLANK,J, J = J1,J2)                            PRNTAF  00062
      LINE = LINE+3                                                     PRNTAF  00063
      GO TO 110                                                         PRNTAF  00064
C                                                                       PRNTAF  00065
  300 CONTINUE                                                          PRNTAF  00066
C                                                                       PRNTAF  00067
C         PRINT THE GENERALIZED AERODYNAMIC COEFFICIENTS                PRNTAF  00068
C         IF DESIRED.                                                   PRNTAF  00069
C                                                                       PRNTAF  00070
      IF(.NOT.PRGNAC) GO TO 1400                                        PRNTAF  00071
      PAGE = 0                                                          PRNTAF  00072
      DO 1300 IPR = 1,2                                                 PRNTAF  00073
      J1 = 1                                                            PRNTAF  00074
      J2 = 8                                                            PRNTAF  00075
      IF (NMODES.LT.J2) J2 = NMODES                                     PRNTAF  00076
      IJ1 = 1                                                           PRNTAF  00077
      IJ2 = (J2-1) * NMODES + 1                                         PRNTAF  00078
C                                                                       PRNTAF  00079
 1100 LINE = LINEMX + 10                                                PRNTAF  00080
 1110 DO 1200 I=1,NMODES                                                PRNTAF  00081
      IF(LINE.LE.LINEMX) GO TO 1170                                     PRNTAF  00082
      PAGE = PAGE + 1                                                   PRNTAF  00083
      LINE = 8                                                          PRNTAF  00084
      WRITE (NT6,7001) XMACH,XKVL                                       PRNTAF  00085
      IF(IPR.EQ.2) GO TO 1140                                           PRNTAF  00086
      IF(PAGE.EQ.1) GO TO 1130                                          PRNTAF  00087
      WRITE (NT6,7005) PC                                               PRNTAF  00088
      GO TO 1160                                                        PRNTAF  00089
 1130 CONTINUE                                                          PRNTAF  00090
      WRITE(NT6,7005)                                                   PRNTAF  00091
      GO TO 1160                                                        PRNTAF  00092
 1140 CONTINUE                                                          PRNTAF  00093
      IF (PAGE.EQ.1) GO TO 1150                                         PRNTAF  00094
      WRITE (NT6,7015) PC                                               PRNTAF  00095
      GO TO 1160                                                        PRNTAF  00096
 1150 WRITE(NT6,7015)                                                   PRNTAF  00097
 1160 CONTINUE                                                          PRNTAF  00098
C                                                                       PRNTAF  00099
      WRITE (NT6,7006)                                                  PRNTAF  00100
      WRITE (NT6,7007)  (J,J=J1,J2)                                     PRNTAF  00101
C                                                                       PRNTAF  00102
 1170 CONTINUE                                                          PRNTAF  00103
      IF(IPR.EQ.2) GO TO 1180                                           PRNTAF  00104
      WRITE(NT6,6010) I,(GPAFC(IJ),IJ=IJ1,IJ2,NMODES)                   PRNTAF  00105
      GO TO 1190                                                        PRNTAF  00106
 1180 CONTINUE                                                          PRNTAF  00107
      WRITE (NT6,6010) I, (GPPAFC(IJ),IJ=IJ1,IJ2,NMODES)                PRNTAF  00108
 1190 CONTINUE                                                          PRNTAF  00109
      LINE = LINE + 1                                                   PRNTAF  00110
      IJ1 = IJ1 + 1                                                     PRNTAF  00111
      IJ2 = IJ2 +1                                                      PRNTAF  00112
```

```
 1200 CONTINUE                                                          PRNTAF  00113
C                                                                       PRNTAF  00114
      J1 = J1 + 8                                                       PRNTAF  00115
      J2 = J2 + 8                                                       PRNTAF  00116
      IF(J1.GT.NMODES) GO TO 1300                                       PRNTAF  00117
      IF(J2.GT.NMODES) J2 = NMODES                                      PRNTAF  00118
      IJ1 = IJ1 + 3*NMODES                                              PRNTAF  00119
      IJ2 = IJ1 + (J2-J1)* NMODES                                       PRNTAF  00120
      IF (LINE.GT.LINEMX-6) GO TO 1100                                  PRNTAF  00121
      WRITE (NT6,7006)                                                  PRNTAF  00122
      LINE = LINE + 3                                                   PRNTAF  00123
      GO TO 1110                                                        PRNTAF  00124
C                                                                       PRNTAF  00125
 1300 CONTINUE                                                          PRNTAF  00126
 1400 CONTINUE                                                          PRNTAF  00127
      RETURN                                                            PRNTAF  00128
C                                                                       PRNTAF  00129
 6001 FORMAT(1H1,51X,18HGENERALIZED FORCES /44X,6H(MACH ,F5.3,5X,*RED. F PRNTAF  00130
     1REQ. =* F8.5,1H) )                                                PRNTAF  00131
 6005 FORMAT(35X,50(1H-),20X,A10,A4)                                    PRNTAF  00132
 6006 FORMAT(5HO WT. / 6H FUNCT, 4(A2,23HVELOCITY POTENTIAL MODE,I3,3X)) PRNTAF  00133
 6007 FORMAT(2X,4(A10,4HREAL,8X, 9HIMAGINARY) )                         PRNTAF  00134
 6010 FORMAT( I4, 8E16.8 )                                              PRNTAF  00135
 7001 FORMAT(1H1,44X,*GENERALIZED AERODYNAMIC COEFFICIENTS*,   /        PRNTAF  00136
     1    44X,6H(MACH , F5.3,5X,12HRED.FREQ. = F8.5,1H) )               PRNTAF  00137
 7006 FORMAT(5HO WT. / 6H FUNCT,27X,*VELOCITY POTENTIAL MODES*,/ )      PRNTAF  00138
 7007 FORMAT(I13,7I16)                                                  PRNTAF  00139
 7005 FORMAT(50X,*REAL PART*,/35X,50(1H-),20X,A10,A4)                   PRNTAF  00140
 7015 FORMAT(50X,*IMAGINARY PART*,/35X,50(1H-),20X,A10,A4)              PRNTAF  00141
      END                                                               PRNTAF  00142
```

```
      FUNCTION LOCSDW(IROW,JCOL,IPNTSD,IPNTIN,IPNTOT,IPNTLS)                LOCSDW  00002
C                                                                           LOCSDW  00003
C         RETURNS THE LOCATION OF THE WORD IN THE END-AROUND SUBDIVIDED     LOCSDW  00004
C         DOWNWASH ARRAY CORRESPONDING TO BOX(IROW,JCOL) OF THE SUB-        LOCSDW  00005
C         DIVIDED BOX ARRAY                                                 LOCSDW  00006
C                                                                           LOCSDW  00007
C              IROW   = BOX CHORDWISE LOCATION                              LOCSDW  00008
C              JCOL   = BOX SPANWISE LOCATION                               LOCSDW  00009
C              IPNTSD = ARRAY OF POINTERS                                   LOCSDW  00010
C              IPNTIN = NEXT AVAILABLE (UNUSED) CELL IN IPNTSD (END-        LOCSDW  00011
C                       AROUND)                                             LOCSDW  00012
C              IPNTOT = FIRST CURRENTLY AVAILABLE CELL IN IPNTSD            LOCSDW  00013
C              IPNTLS = LAST CELL OF IPNTSD (LENGTH OF ARRAY)               LOCSDW  00014
C         RETURN -                                                          LOCSDW  00015
C              LOCSDW = LOCATION OF DESIRED DOWNWASH, IF SUCCESSFUL         LOCSDW  00016
C                     = 0, IF LOCPNT LIES OUTSIDE THE DEFINED AREA.         LOCSDW  00017
C                                                                           LOCSDW  00018
      DIMENSION IPNTSD(2,IPNTLS)                                            LOCSDW  00019
C                                                                           LOCSDW  00020
      LOCPNT = MOD(IROW-1,IPNTLS) + 1                                       LOCSDW  00021
C             LOCPNT = LOCATION OF CELL IN IPNTSD WHICH WAS OR IS TO BE     LOCSDW  00022
C                      USED                                                 LOCSDW  00023
      IF(IPNTIN - IPNTOT) 100, 300, 200                                     LOCSDW  00024
C         END AROUND HAS OCCURRED                                           LOCSDW  00025
  100 IF (LOCPNT - IPNTIN) 400, 300, 150                                    LOCSDW  00026
C         NOT IN UPPER PART. IS LOCPNT WITHIN BOTTOM PART -                 LOCSDW  00027
  150 IF (LOCPNT - IPNTOT) 300, 400, 400                                    LOCSDW  00028
C                                                                           LOCSDW  00029
C         NO END AROUND, NORMAL SEQUENCE                                    LOCSDW  00030
  200 IF (LOCPNT - IPNTIN) 250, 300, 300                                    LOCSDW  00031
C         LESS THAN UPPER LIMIT. IS LOCPNT .GE. LOWER LIMIT -               LOCSDW  00032
  250 IF (LOCPNT .GE. IPNTOT) GO TO 400                                     LOCSDW  00033
C                                                                           LOCSDW  00034
C         ERROR OR INITIAL CONDITION ENCOUNTERED (SHOULD NEVER OCCUR)       LOCSDW  00035
  300 LOCSDW = 0                                                            LOCSDW  00036
      GO TO 500                                                             LOCSDW  00037
C                                                                           LOCSDW  00038
C         SUCCESSFUL, BOX HAS BEEN DEFINED                                  LOCSDW  00039
  400 IFB = IPNTSD(2,LOCPNT)                                                LOCSDW  00040
      IF(JCOL.LT.IFB) GO TO 300                                             LOCSDW  00041
      LOCSDW = IPNTSD(1,LOCPNT) + JCOL-IFB                                  LOCSDW  00042
C                                                                           LOCSDW  00043
  500 CONTINUE                                                              LOCSDW  00044
      RETURN                                                                LOCSDW  00045
      END                                                                   LOCSDW  00046
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13 ABSTRACT

The Mach box technique has been extended to include wing and tail with dihedral angles and vertical separation. A digital computer program, written in FORTRAN, is presented. The program provides for up to nine sweep angles of the leading and trailing edges of each surface. First order piston theory thickness correction is available as an option and two refinement procedures are provided, subdivision with averaging and velocity potential smoothing. For a maximum of twenty oscillatory mode shapes the program calculates normal washes, velocity potentials, lifts, pressures and generalized forces matrices. If only one surface is being analyzed, sampling of wake up-wash, side-wash and longitudinal wash is available.

The methods described in this report are intended to be used by airplane designers to calculate with improved accuracy, the unsteady aerodynamic loads that act on a lifting surface being propelled at supersonic speeds. The new feature of these calculations is that the aerodynamic interference between the wing and tail has been taken into account. These calculations are an essential ingredient of flutter analyses and will improve the confidence level of such calculations in preventing wing-tail flutter. The general requirement for such calculations are contained in Military Specification MIL-A-8870A (USAF).

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